

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2001-178021

(P2001-178021A)

(43) 公開日 平成13年6月29日 (2001.6.29)

(51) Int. Cl.	識別記号	F I	テマコード (参考)
H 0 2 J 9/06	5 0 2	H 0 2 J 9/06	5 0 2 F 5 B 0 1 1
			5 0 2 B 5 B 0 7 9
G 0 6 F 1/32		G 0 6 F 1/04	3 0 1 C 5 G 0 1 5
1/04	3 0 1	1/00	3 3 2 Z

審査請求 未請求 請求項の数28 O L (全 12 頁)

(21) 出願番号 特願平11-352228

(22) 出願日 平成11年12月10日 (1999. 12. 10)

(71) 出願人 000002185

ソニー株式会社

東京都品川区北品川6丁目7番35号

(72) 発明者 天野 敏夫

東京都品川区北品川6丁目7番35号 ソニー株式会社内

(72) 発明者 大村 正

東京都品川区北品川6丁目7番35号 ソニー株式会社内

(74) 代理人 100094053

弁理士 佐藤 隆久

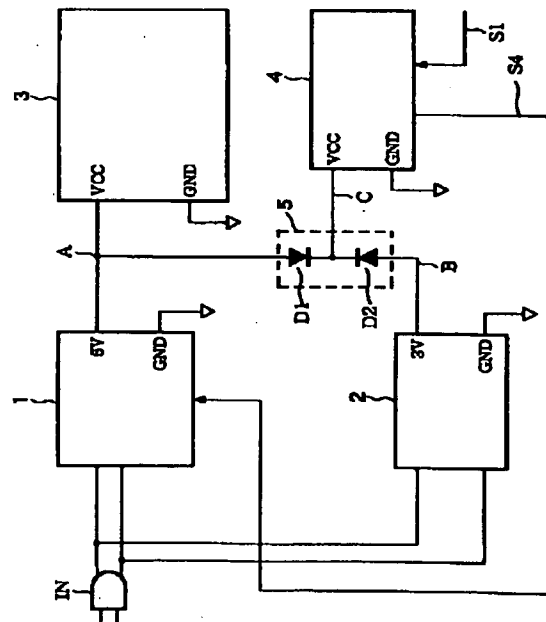
最終頁に続く

(54) 【発明の名称】 電子機器

(57) 【要約】

【課題】 待機状態時の動作を保证する電源電圧の最低値が通常状態より小さい従回路4を有する電子機器において、待機状態における待機電力を制御する機能を有した電子機器を提供する。

【解決手段】 通常状態を選択する動作状態選択信号S4を受けて5Vを出力し、待機状態を選択する動作状態選択信号S4を受けて0Vを出力する主電源1と、3Vを出力する待機動作電源2と、主電源1による5Vを受けて通常状態の動作を行い、主電源1による0Vを受けて動作を停止する主回路3と、主電源1による5Vを受けて通常状態の動作を行い、待機動作電源2による3Vを受けて待機状態の動作を行う従回路4と、主電源1の出力ならびに待機動作電源2の出力を受けて、いずれか大きい電圧を選択して従回路4に供給する電源切換部5とを有するようにした。



BEST AVAILABLE COPY

【特許請求の範囲】

【請求項1】待機状態と通常状態を有する電子機器であって、
通常状態を選択する動作状態選択信号を受けたとき第1の電圧を出力し、待機状態を選択する動作状態選択信号を受けたとき第2の電圧を出力する主電源と、
上記第1の電圧より小さく上記第2の電圧より大きい第3の電圧を出力する待機動作電源と、
上記主電源による第1の電圧を受けて通常状態の動作を行い、上記主電源による第2の電圧を受けて動作を停止する主回路と、
上記主電源による第1の電圧を受けて通常状態の動作を行い、上記待機動作電源による第3の電圧を受けて待機状態の動作を行う従回路と、
上記主電源の出力ならびに上記待機動作電源の出力を受けて、いずれか大きい電圧を選択して従回路に供給する電源切換部とを有する電子機器。

【請求項2】上記従回路は、
機器操作信号を受け取り、
機器操作信号が通常状態を指定する信号のときは通常状態を選択する動作状態選択信号を上記主電源に出力し、
機器操作信号が待機状態を指定する信号のときは待機状態を選択する動作状態選択信号を上記主電源に出力する、
請求項1記載の電子機器。

【請求項3】上記従回路は、
通常状態のときには機器制御信号を上記主回路に出力する、
請求項2記載の電子機器。

【請求項4】上記従回路は、
通常状態のときには第1の周波数で動作し、
待機状態のときには当該第1の周波数より低い第2の周波数で動作する、
請求項1記載の電子機器。

【請求項5】上記従回路は、
通常状態のときには第1の周波数で動作し、
待機状態のときには当該第1の周波数より低い第2の周波数で動作する、
請求項3記載の電子機器。

【請求項6】上記主回路は、
通常状態のときには第1の周波数で動作し、
上記従回路は、
通常状態のときには上記機器制御信号が第1の周波数に同期する、
請求項5記載の電子機器。

【請求項7】上記従回路は、
待機状態において上記通常状態を指定する機器操作信号を受け取ったときは、上記通常状態を選択する動作状態選択信号を主電源に出力したあと、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換え

る、
請求項5記載の電子機器。

【請求項8】上記従回路は、
通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、動作周波数を第2の周波数に切り換えたあと、上記待機状態を選択する動作状態選択信号を主電源に出力する、
請求項7記載の電子機器。

【請求項9】上記従回路は、
待機状態において上記機器操作信号を受け取ったときは、動作周波数を第1の周波数より低い第3の周波数に切り換えてから上記通常状態を選択する動作状態選択信号を主電源に出力し、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換える、
請求項5記載の電子機器。

【請求項10】上記従回路は、
通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、上記待機状態を選択する動作状態選択信号を主電源に出力したあと、動作周波数を第2の周波数に切り換える、
請求項9記載の電子機器。

【請求項11】上記従回路は、
待機状態において上記通常状態を指定する機器操作信号を受け取ったときは、上記通常状態を選択する動作状態選択信号を主電源に出力したあと、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換える、
請求項6記載の電子機器。

【請求項12】上記従回路は、
通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、動作周波数を第2の周波数に切り換えたあと、上記待機状態を選択する動作状態選択信号を主電源に出力する、
請求項11記載の電子機器。

【請求項13】上記従回路は、
待機状態において上記機器操作信号を受け取ったときは、動作周波数を第1の周波数より低い第3の周波数に切り換えてから上記通常状態を選択する動作状態選択信号を主電源に出力し、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換える、
請求項6記載の電子機器。

【請求項14】上記従回路は、
通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、上記待機状態を選択する動作状態選択信号を主電源に出力したあと、動作周波数を第2の周波数に切り換える、
請求項13記載の電子機器。

【請求項15】待機状態と通常状態を有する電子機器であって、
入力に所定の電圧を受けて第1の電圧を出力する主電源

と、
 上記主電源の入力と電子機器に電圧を供給する入力との間に接続され、通常状態を選択する動作状態選択信号を受けたとき導通し、待機状態を選択する動作状態選択信号を受けたとき開放する入力スイッチと、
 上記第1の電圧より小さい第2の電圧を出力する待機動作電源と、
 上記主電源による第1の電圧を受けて通常状態の動作を行う主回路と、
 上記主電源による第1の電圧を受けて通常状態の動作を行い、上記待機動作電源による第2の電圧を受けて待機状態の動作を行う従回路と、
 上記主電源の出力ならびに上記待機動作電源の出力を受けて、いずれか大きい電圧を選択して従回路に供給する電源切換部とを有する電子機器。

【請求項16】上記従回路は、
 機器操作信号を受け取り、
 機器操作信号が通常状態を指定する信号のときは通常状態を選択する動作状態選択信号を上記入力スイッチに出力し、
 機器操作信号が待機状態を指定する信号のときは待機状態を選択する動作状態選択信号を上記入力スイッチに出力する、
 請求項15記載の電子機器。

【請求項17】上記従回路は、
 通常状態のときには機器制御信号を上記主回路に出力する、
 請求項16記載の電子機器。

【請求項18】上記従回路は、
 通常状態のときには第1の周波数で動作し、
 待機状態のときには当該第1の周波数より低い第2の周波数で動作する、
 請求項15記載の電子機器。

【請求項19】上記従回路は、
 通常状態のときには第1の周波数で動作し、
 待機状態のときには当該第1の周波数より低い第2の周波数で動作する、
 請求項17記載の電子機器。

【請求項20】上記主回路は、
 通常状態のときには第1の周波数で動作し、
 上記従回路は、
 通常状態のときには上記機器制御信号が第1の周波数に同期する、請求項19記載の電子機器。

【請求項21】上記従回路は、
 待機状態において上記通常状態を指定する機器操作信号を受け取ったときは、上記通常状態を選択する動作状態選択信号を入力スイッチに出力したあと、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換える、
 請求項19記載の電子機器。

【請求項22】上記従回路は、
 通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、動作周波数を第2の周波数に切り換えたあと、上記待機状態を選択する動作状態選択信号を入力スイッチに出力する、
 請求項21記載の電子機器。

【請求項23】上記従回路は、
 待機状態において上記機器操作信号を受け取ったときは、動作周波数を第1の周波数より低い第3の周波数に切り換えてから上記通常状態を選択する動作状態選択信号を入力スイッチに出力し、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換える、
 請求項19記載の電子機器。

【請求項24】上記従回路は、
 通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、上記待機状態を選択する動作状態選択信号を入力スイッチに出力したあと、動作周波数を第2の周波数に切り換える、
 請求項23記載の電子機器。

20 【請求項25】上記従回路は、
 待機状態において上記通常状態を指定する機器操作信号を受け取ったときは、上記通常状態を選択する動作状態選択信号を入力スイッチに出力したあと、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換える請求項20記載の電子機器。

【請求項26】上記従回路は、
 通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、動作周波数を第2の周波数に切り換えたあと、上記待機状態を選択する動作状態選択信号を入力スイッチに出力する、
 請求項25記載の電子機器。

30 【請求項27】上記従回路は、
 待機状態において上記機器操作信号を受け取ったときは、動作周波数を第1の周波数より低い第3の周波数に切り換えてから上記通常状態を選択する動作状態選択信号を入力スイッチに出力し、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換える、
 請求項20記載の電子機器。

40 【請求項28】上記従回路は、
 通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、上記待機状態を選択する動作状態選択信号を入力スイッチに出力したあと、動作周波数を第2の周波数に切り換える、
 請求項28記載の電子機器。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、待機状態と通常状態を有する電子機器に係り、特に、待機状態における消費電力を削減する電子機器に関するものである。

50 【0002】

【従来の技術】近年、省エネルギーや環境問題の観点から、通常の使用状態を離れた状態にある電子機器が、通電されたままの状態でも消費する電力（以下、待機電力という）を削減することが、産業界の課題の一つになっている。そのため、通常の動作をしている状態（以下、通常状態という）に加えて、通常の動作状態を停止して電力の消費を抑えた状態（以下、待機状態という）を設けた電子機器が製造されている。

【0003】従来は、電子機器を待機状態に設定したとき、待機状態において動作していない回路（以下、主回路という）への電源電圧の供給を断つことによって電子機器の待機電力を削減させている。また待機状態において動作する回路（以下、従回路という）にコンピュータを有する電子機器の場合は、上記の方法に加えて、待機状態のコンピュータのクロック周波数を低下させたりクロックを停止することにより、さらなる待機電力の削減を図っている。

【0004】

【発明が解決しようとする課題】しかしながら、従回路の待機状態における正常な動作を保証する電源電圧の最小値は、通常状態の最小値にくらべて減少する場合があります。その場合、減少した分の電圧によって待機状態時に消費される電力は、従回路の安定な動作に関係しないにも係らず無駄に消費されていた。

【0005】本発明はかかる事情に鑑みてなされたものであり、その目的は、待機状態における待機電力を削減できる電子機器を提供することにある。

【0006】

【課題を解決するための手段】上記の目的を達成するため、本発明の電子機器では、通常状態を選択する動作状態選択信号を受けて第1の電圧を出力し、待機状態を選択する動作状態選択信号を受けて第2の電圧を出力する主電源と、上記第1の電圧より小さく上記第2の電圧より大きい第3の電圧を出力する待機動作電源と、上記主電源による第1の電圧を受けて通常状態の動作を行い、上記主電源による第2の電圧を受けて動作を停止する主回路と、上記主電源による第1の電圧を受けて通常状態の動作を行い、上記待機動作電源による第3の電圧を受けて待機状態の動作を行う従回路と、上記主電源の出力ならびに上記待機動作電源の出力を受けて、いずれか大きい電圧を選択して従回路に供給する電源切換部とを有するようにした。

【0007】本発明の電子機器では、入力に所定の電圧を受けて第1の電圧を出力する主電源と、上記主電源の入力と電子機器に電圧を供給する入力との間に接続され、通常状態を選択する動作状態選択信号を受けたとき導通し、待機状態を選択する動作状態選択信号を受けたとき開放する入力スイッチと、上記第1の電圧より小さい第2の電圧を出力する待機動作電源と、上記主電源による第1の電圧を受けて通常状態の動作を行う主回路

と、上記主電源による第1の電圧を受けて通常状態の動作を行い、上記待機動作電源による第2の電圧を受けて待機状態の動作を行う従回路と、上記主電源の出力ならびに上記待機動作電源の出力を受けて、いずれか大きい電圧を選択して従回路に供給する電源切換部とを有するようにした。

【0008】本発明の電子機器の上記従回路では、機器操作信号を受け取らせ、機器操作信号が通常状態を指定する信号のときは通常状態を選択する動作状態選択信号を上記主電源に出力させ、機器操作信号が待機状態を指定する信号のときは待機状態を選択する動作状態選択信号を上記主電源に出力させた。

【0009】本発明の電子機器の上記従回路では、通常状態のときには機器制御信号を上記主回路に出力させた。

【0010】本発明の電子機器の上記従回路では、通常状態のときには第1の周波数で動作させ、待機状態のときには当該第1の周波数より低い第2の周波数で動作させた。加えて、上記主回路では、通常状態のときには第1の周波数で動作させ、上記従回路では、通常状態のときには上記機器制御信号を第1の周波数に同期させた。

【0011】本発明の電子機器の上記従回路では、待機状態において上記通常状態を指定する機器操作信号を受け取ったときは、上記通常状態を選択する動作状態選択信号を主電源に出力したあと、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換えさせ、通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、動作周波数を第2の周波数に切り換えたあと、上記待機状態を選択する動作状態選択信号を主電源に出力させた。または、上記従回路では、待機状態において上記機器操作信号を受け取ったときは、動作周波数を第1の周波数より低い第3の周波数に切り換えてから上記通常状態を選択する動作状態選択信号を主電源に出力し、あらかじめ設定した時間の経過後に、動作周波数を第1の周波数に切り換えさせ、通常状態において上記待機状態を指定する機器操作信号を受け取ったときは、上記待機状態を選択する動作状態選択信号を主電源に出力したあと、動作周波数を第2の周波数に切り換えさせた。

【0012】本発明の電子機器によれば、主電源が通常状態または待機状態（以下、両状態を動作状態という）を選択する信号（以下、動作状態選択信号という）を受け取ると、電子機器はその信号に応じて通常状態または待機状態に設定される。通常状態時には、主電源から主回路と従回路へ電圧が供給されて、通常の動作が行われる。待機状態時には、主電源から主回路へ通常状態より低い電圧が供給されて、主回路の動作は停止される。このため、電子機器は通常の動作が停止した、待機状態に設定される。このとき、従回路には通常状態の主電源の電圧より低い電圧が待機動作電源より供給されて、待

機状態の動作が行われる。

【0013】具体的には、動作状態選択信号として通常状態を選択する動作状態選択信号を受け取ると、主回路には第1の電圧が主電源から供給される。これにより主回路では通常の動作が行われるので、電子機器は通常状態に設定される。一方、電源切換部は主電源の出力電圧と待機動作電源の出力電圧を受けており、いずれか大きい電圧が選択されて、従回路に供給される。このとき、電圧切換部には主電源による第1の電圧と待機動作電源による電圧が入力されるが、待機動作電源の出力電圧は主電源による第1の電圧より小さくなるよう設定されているため、電圧切換部の出力には主電源による第1の電圧が出力される。したがって、従回路には主電源による第1の電圧が供給される。

【0014】また、待機状態を選択する動作状態選択信号を受け取ると、主回路には、主電源による第1の電圧や待機動作電源による電圧より低い第2の電圧が主電源から供給される。この第2の電圧は主回路の動作できる電源電圧より低いため、主回路の動作は停止し、これにより、電子機器は待機状態に設定される。このとき、電圧切換部には主電源による第2の電圧と待機動作電源による電圧が入力されるが、待機動作電源の出力電圧は主電源による第2の電圧より大きくなるよう設定されているため、電圧切換部の出力には待機動作電源による電圧が出力される。したがって、従回路には待機動作電源による電圧が供給される。

【0015】本発明の電子機器によれば、入力スイッチが動作状態選択信号を受け取ると、電子機器はその信号に応じて通常状態または待機状態に設定される。通常状態時には、主回路と従回路は主電源から電圧を供給されて、通常の動作が行われる。待機状態時には、主電源から主回路へ電圧が供給されず、主回路の動作は停止される。このため、電子機器は通常の動作が停止した、待機状態に設定される。このとき、従回路には通常状態の主電源の電圧より低い電圧が待機動作電源より供給されて、待機状態の動作が行われる。

【0016】具体的には、入力スイッチが通常状態を選択する動作状態選択信号を受け取ると、入力スイッチが導通し、主電源の入力には、電子機器へ電圧を供給する電源入力から、電圧が供給される。これにより、主電源は第1の電圧を出力する。主電源による第1の電圧を供給された主回路は、通常の動作を行うので、電子機器は通常状態に設定される。一方、電源切換部は主電源の出力電圧と待機動作電源の出力電圧を受けており、いずれか大きい電圧が選択されて、従回路に供給される。このとき、電圧切換部には主電源による第1の電圧と待機動作電源による第2の電圧が入力されるが、待機動作電源による第2の電圧は主電源による第1の電圧より小さくなるよう設定されているため、電圧切換部の出力には主電源による第1の電圧が出力される。したがっ

て、従回路には主電源による第1の電圧が供給される。

【0017】また、入力スイッチが待機状態を選択する動作状態選択信号を受け取ると、入力スイッチが非導通になり、これにより、電源入力から主電源の入力に供給されていた電圧が断たれるため、主電源の出力電圧は0Vへ低下する。主電源から供給される電圧が電圧が0Vへ低下してしまうため、主回路の動作は停止し、電子機器は待機状態に設定される。このとき、電圧切換部には主電源による電圧0Vと待機動作電源による第2の電圧が入力されるが、待機動作電源の出力電圧は0Vへ低下した主電源による電圧より大きいので、電圧切換部の出力には待機動作電源による第2の電圧が出力される。したがって、従回路には待機動作電源による第2の電圧が供給される。

【0018】

【発明の実施の形態】図1は、本発明に係る電子機器の第1の実施形態を示す回路図である。図1において、1は直流出力の主電源、2は直流出力の待機動作電源、3は主回路、4は従回路、5が電源切換部、D1、D2はダイオードをそれぞれ示している。また、INは電子機器に電力を供給するための電源入力、A、B、Cは回路のノード、S1は機器操作信号、S4は動作状態選択信号をそれぞれ示している。

【0019】主電源1は電源入力INから電圧を受けて動作し、主回路3と電源切換部5に直流電圧を出力すると共に、従回路4から動作状態選択信号S4を受けている。動作状態選択信号S4が通常状態を選択する信号のとき、主電源1は主回路を動作させる直流電圧、例えば5Vを出力し、動作状態選択信号S4が待機状態を選択する信号のとき、主電源1は通常状態より低い電圧、例えば0Vを出力する。待機動作電源2は電源入力INから電圧を受けて動作し、主電源1が通常状態において出力する電圧より小さく待機状態において出力する電圧より大きい、例えば3Vの直流電圧を、電源切換部5に出力する。主電源1と待機動作電源2の出力の負側端子は、回路の共通なグランドに接続されている。

【0020】電源切換部5は主電源1と待機用電源2からの電圧を受け、両者の電圧を比較し、いずれか大きい電圧を、従回路4へ出力している。この電圧切換部は、具体的にはダイオードD1、D2で構成されている。ダイオードD1のアノードは主電源1からの電圧を、ダイオードD2のアノードは待機動作電源2からの電圧をそれぞれ受けている。これら2つのダイオードのカソードはともに接続されて、その接続点が電圧切換部の出力となり、従回路4に電圧を出力している。なお、電源切換部5は、ダイオードD1、D2をトランジスタなどの半導体素子によるスイッチに変えて構成することも可能である。

【0021】主回路3は主電源1から電圧を受けて、通常状態時に動作する。従回路4は電源切換部5から電圧

を受けて動作するとともに、機器操作信号S1を受けてこれを処理し、動作状態選択信号S4を主電源1に出力する。動作状態選択信号S4は、電子機器の動作状態を通常状態または待機状態のいずれかに選択する信号である。主回路3と従回路4のグラウンド端子は、回路の共通なグラウンドに接続されている。

【0022】次に、以上の構成における動作を説明する。従回路4が待機状態を指定する機器操作信号S1を受け取ると、従回路4は待機状態を選択する動作状態選択信号S4を主電源1に出力する。前記信号を受け取った主電源1は、出力電圧として、例えば0Vを出力する。主電源1から電圧を受けている主回路3は、この主電源1による電圧0Vでは動作できないため、動作を停止する。主回路3が動作を停止することにより、電子機器は待機状態となる。主電源1の出力であるA点の電圧が0Vになる一方、B点には待機動作電源2による電圧、例えば3Vになっており、B点の電圧はA点の電圧より大きくなる。これにより、ダイオードD2が導通しダイオードD1が非導通になるので、従回路4にはダイオードD2を介し待機動作電源2の電源電圧3Vが供給される。従回路4は電源電圧3Vでも動作する素子で構成してあるため、正常に動作する。

【0023】従回路4が通常状態を指定する機器操作信号S1を受け取ると、従回路4は通常状態を選択する動作状態選択信号S4を主電源1に出力する。前記信号を受け取った主電源1は、出力電圧として、例えば5Vを出力する。主電源1から電圧を受けている主回路3は、この主電源1による電圧5Vによって動作を開始する。主回路3が通常の動作をすることにより、電子機器は通常状態となる。主電源1の出力であるA点の電圧が5Vになる一方、B点には待機動作電源2による電圧3Vのままであり、B点の電圧はA点の電圧より小さくなる。これにより、ダイオードD1が導通しダイオードD2が非導通になるので、従回路4にはダイオードD1を介し主電源1の電源電圧3Vが供給される。従回路4は電源電圧5Vでも動作する素子で構成してあるため、正常に動作する。

【0024】以上説明したように、第1の実施形態によれば、待機状態時に従回路4の動作に必要な電源電圧の最低値が通常状態時に主回路3の動作に必要な電源電圧の最低値にくらべて低い場合、待機状態時に従回路4へ供給する電源電圧を通常状態にくらべて小さくすることができる。これにより、主回路3のみならず従回路4の消費電力も削減できるため、本発明による待機電力制御機能を有しない場合にくらべ電子機器の待機電力を削減できる。

【0025】また、第1の実施形態において、従回路4があらかじめ設定されたクロック周波数で動作する場合、従回路4に、電源電圧に応じてクロック周波数を変える回路を追加することによって、電子機器の待機電力

を更に削減させることができる。具体的には、従回路4は、従回路4が通常状態の電源電圧を受けたときクロックを通常状態の動作に必要な第1の周波数に設定し、待機状態の電源電圧を受けたときクロックを第1の周波数より低い第2の周波数に変更する回路を有している。従回路4に前記の回路を追加することにより、待機状態におけるクロックの周波数が下がり、これにより、クロックの1周期に従回路4の各部の容量成分へ流れる充放電電流によって生ずる電力損失の単位時間あたりの量が減少するため、電子機器の待機電力を削減できる。

【0026】次に、本発明に係る電子機器の第2の実施形態について説明する。図2は、第2の実施形態を示す回路図である。図1と図2の同じ符号は、同じ内容を表している。図2において、1Aは直流出力の主電源、4Aは従回路、6は入力スイッチ、RLはリレー、Qはnpnトランジスタ、Rは抵抗をそれぞれ示している。

【0027】主電源1Aの入力は、入力スイッチ6を介して、電源入力INから電圧を受けている。入力スイッチ6が導通したとき主電源1Aは動作し、直流電圧例えば5Vを、主回路3と電源切換部5に出力する。主電源1Aの出力の負側端子は、回路の共通なグラウンドに接続されている。

【0028】従回路4Aは電源切換部5から電圧を受けて動作するとともに、機器操作信号S1を受けてこれを処理し、動作状態選択信号S4を入力スイッチ6に出力する。動作状態選択信号S4は、電子機器の動作状態を通常状態または待機状態のいずれかに選択する信号である。主回路のグラウンドは、回路の共通なグラウンドに接続されている。

【0029】入力スイッチ6は、電源入力INと主電源1Aの間に接続されおり、従回路4Aから受けた動作状態選択信号4に応じて、電源入力INと主電源1Aの間の電気的接続を導通または非導通にする。動作状態選択信号4が待機状態を選択する信号のとき入力スイッチ6は導通し、待機状態を選択する信号のとき入力スイッチ6は非導通になる。入力スイッチ6は、具体的にはリレーRL、リレー駆動用のnpnトランジスタQ、ベース抵抗Rにより構成されている。リレーRLの接点は電源入力INと主電源1Aの間に接続されており、接点を駆動するコイルの一方の端子は待機動作電源2から電圧を受けており、他方の端子はnpnトランジスタQのコレクタに接続されている。リレーRLの接点は駆動コイルに規定の電流を流したとき接点を導通する。npnトランジスタQのエミッタは回路の共通なグラウンドに接続されており、ベースは抵抗Rを介して従回路4Aから動作状態選択信号S4を受けている。なお、リレーRLを駆動するための電圧は、待機動作電源2の出力に限らず、リレーの駆動に必要な電圧の範囲内であり、かつ待機と通常いずれの状態でも電圧を供給できるところ、例えばC点などから受けても可能である。また、入力スイ

ッチ6は、リレーRLをトランジスタなどの半導体素子によるスイッチに置き換えて構成することも可能である。

【0030】次に、以上の構成における動作を説明する。従回路4Aが待機状態を指定する機器操作信号S1を受け取ると、動作状態選択信号S4は0Vになり、npnトランジスタQのベース電流が枯渇するため、npnトランジスタQのコレクター-エミッター間が非導通になり、リレーRLの駆動コイル電流が流れなくなって、リレーRLは切断する。リレーRLが切断すると、主電源1Aへの入力電圧が断たれ、主電源1Aの出力電圧は0Vに向かって低下し、B点の電圧はA点の電圧より大きくなる。これにより、ダイオードD2が導通しダイオードD1が非導通になるので、従回路4AにはダイオードD2を介し待機動作電源2の出力電圧、例えば3Vが供給される。従回路4Aは電源電圧が3Vでも動作する素子で構成してあるため、正常に動作する。主回路3は電源電圧の供給が断たれ、回路の動作が停止するため、電子機器は待機状態となる。

【0031】従回路4Aが通常状態を指定する機器操作信号S1を受け取ると、動作状態選択信号S4の電圧によって抵抗RにnpnトランジスタQのベース電流が流れ、npnトランジスタQのエミッター-コレクタ間が導通して、リレーRLの駆動コイルに電流が流れるため、リレーRLの接点は導通する。リレーRLが導通すると、主電源1Aに入力電圧が供給され、A点の電圧は主電源の出力電圧、例えば5Vになる。主電源1の出力電圧5Vは待機動作電源2の出力電圧3Vより大きく設定しているので、B点の電圧はA点の電圧より小さくなる。これにより、ダイオードD2が非導通になりダイオードD1が導通するので、従回路4AにはダイオードD1を介し主電源1Aの電源電圧が供給される。従回路4Aは電源電圧が5Vでも動作する素子で構成してあるため、正常に動作する。主回路3は主電源1Aの電圧5Vが供給されて動作を開始し、電子機器は通常状態となる。

【0032】以上説明したように、第2の実施形態によれば、第1の実施形態のように主電源1Aが出力電圧を制御する機能を有していなくても、リレーなどによる簡単な構成の入力スイッチ6を主電源1Aの入力側に設けることによって、主電源1Aの出力電圧を制御することができる。これにより、待機状態時に従回路4Aの動作に必要な電源電圧の最低値が通常状態時に主回路3の動作に必要な電源電圧の最低値にくらべて低い場合、待機状態時に従回路4Aへ供給する電源電圧を通常状態にくらべて小さくすることができる。したがって、待機状態時に主回路3のみならず従回路4Aの消費電力も削減できるため、本発明による待機電力制御機能を有しない場合に比べて電子機器の待機電力を削減できる。

【0033】また、第2の実施形態において、従回路4

があらかじめ設定されたクロック周波数で動作する場合、従回路4Aに、電源電圧に応じてクロック周波数を変える回路を追加することによって、電子機器の待機電力を更に削減させることができる。具体的には、従回路4Aは、従回路4Aが通常状態の電源電圧を受けたときクロックを通常状態の動作に必要な第1の周波数に設定し、待機状態の電源電圧を受けたときクロックを第1の周波数より低い第2の周波数に変更する回路を有している。従回路4Aに前記の回路を追加することにより、待機状態におけるクロックの周波数が下がり、クロックの1周期に従回路4Aの各部の容量成分へ流れる充放電電流によって生ずる電力損失の単位時間あたりの量が減少するため、電子機器の待機電力を削減できる。

【0034】次に、本発明に係る電子機器の第3の実施形態について説明する。図3は、第3の実施形態を示す回路図である。図2と図3の同じ符号は、同じ内容を表している。図3において、2Aは直流出力の特機動作電源、3Aは主回路、4Bは従回路、41は入力回路、42はコンピュータ、43は不揮発性メモリ、44はリセット回路、D3はダイオード、C1、C2はコンデンサ、Tはトランス、Uは電圧安定化回路をそれぞれ示している。また、S3は機器制御信号を示している。

【0035】待機動作電源2Aは電源入力INから電圧を受けて動作し、主電源1Aが通常状態において出力する電圧より小さく待機状態において出力する電圧より大きい、例えば3Vの直流電圧を、電源切換部5に出力する。待機動作電源2Aの出力の負側端子は、回路の共通なグラウンドに接続されている。この待機動作電源2Aは、具体的にはトランスT、ダイオードD3、コンデンサC1、C2、電圧安定化回路U1によって構成されている。トランスTは、一次側が電源入力INに接続されており、2次側の一方の端子はダイオードD3のアノードに、他方の端子は回路の共通のグラウンドに接続されている。ダイオードD3はアノードがトランスTの二次側端子に接続されており、カソードはコンデンサC1と電圧安定化回路Uの入力およびリレーRLの駆動コイルに接続されている。コンデンサC1は、一方の端子はダイオードD3のカソードに、他方の端子は共通のグラウンドに接続されており、その両端にはトランスTとダイオードD3で整流された電圧を平滑した直流電圧、例えば4Vが発生する。図3ではこの電圧4Vをリレー駆動用の電圧としてリレーRLの駆動コイルに供給しているが、リレーRLの駆動が可能な電圧の範囲であれば、B点やC点から電圧を供給することも可能である。電圧安定化回路Uは、ダイオードD3のカソードから受けた電圧4Vを降圧および安定化し、直流電圧例えば3Vを、電源切換部5に出力する。コンデンサC2は、一方の端子が電圧安定化回路Uの出力に、他方の端子が回路の共通のグラウンドに接続されており、電圧安定化回路Uの出力電圧に含まれる高周波成分を除去する。

【0036】主回路3Aは、主電源1Aから電圧を受け、通常状態時に動作する。また、従回路4Bから受ける機器制御信号S3によって、電子機器の外部から送られる機器操作信号S1に応じた動作をする。主回路3Aのグランドは、回路の共通なグランドに接続されている。従回路4Bは電源切換部5から電圧を受けて、通常と待機いずれの状態でも動作する。また、機器操作信号S1を受けてこれを処理し、動作状態選択信号S4を入力スイッチ6に出力するとともに、主回路3Aへ機器操作信号S3を出力する。従回路4Bのグランドは、回路の共通なグランドに接続されている。動作状態選択信号S4は、電子機器の動作状態を通常状態または待機状態のいずれかに選択する信号である。機器制御信号S3は、機器操作信号S1を従回路4Bが処理して生成した信号、および従回路4Bが主回路3Aを制御するための信号である。なお、主回路3Aと従回路4Bを同じクロックで動作させる場合には、機器制御信号S3として、従回路4Bのクロックとこれに同期した制御信号を主回路3Aに出力することが可能である。これにより、通常状態において、主回路3Aは従回路4Bと同期した同じ周波数のクロックで動作する。また、機器制御信号S3は従回路4Bのクロックと同期する。

【0037】この従回路4Bは、具体的には入力回路41、コンピュータ42、不揮発性メモリ43、リセット回路44の各回路で構成されている。入力回路41は機器操作信号S1を処理した信号をコンピュータ42に送っている。コンピュータ42は入力回路から受け取った信号を処理し、機器制御信号S3を生成して主回路3Aに出力するとともに、入力スイッチに動作状態選択信号S4を出力し、電子機器の動作状態の制御を行っている。また、リセット回路からコンピュータの動作を初期化する信号を受け取る。さらに、例えば動作状態に関する情報の書き込みと読み出しに関する信号を、不揮発性メモリ43との間で入力または出力している。リセット回路44は、例えば電子機器の電源の投入時に、コンピュータをリセットするための信号を、コンピュータ42に送っている。不揮発性メモリ43は、例えば現在の動作状態の情報をコンピュータ42から受け取って格納している。そしてコンピュータ42は、例えば電子機器へ供給する電圧が遮断されたあと再び供給されたとき、電圧を遮断する前の前記情報を不揮発性メモリ43から受け取って、電圧が遮断される前の状態に復帰する。

【0038】次に、以上の構成による動作の説明を行う。図4は図3の回路の動作を説明したタイミングチャートである。(A)は動作状態、すなわち待機状態または通常状態の変化を表している。(B)と(C)はダイオードD1とD2の導通状態、すなわちダイオードの導通または非導通の変化を表している。図のONおよびOFFの記号は、ONが導通、OFFが非導通であることを表している。(D)は図2のC点の電圧、すなわち従

回路4Bに供給される電源電圧の変化を表している。

(E)はクロック・モード、すなわちコンピュータ42のクロック周波数の変化を表している。(F)は入力回路41に送られる機器操作信号S1の変化を表している。機器操作信号S1は、例えば外部の機器から赤外線によって送られてくる、時系列の信号である。図のONおよびOFFの記号は、ONは通常状態を指定する信号、OFFは待機状態を指定する信号が送られてきたことを表している。(G)は入力スイッチ6に入力される動作状態選択信号S4、すなわち入力スイッチ6の開閉を制御する電圧の変化を表している。T0～T8は時刻を表している。

【0039】第3の実施形態を示す図3の回路の動作を、図4のタイムチャートを用いて説明する。時刻T0において、動作状態選択信号S4は0Vに設定されており、リレーRLの接点は開放している。このため主電源1Aは出力せず、主回路3Aに電圧が供給されていないので、電子機器の動作状態は待機状態にある。B点の電圧は、トランスTとダイオードD3とコンデンサC1が構成している半波整流回路の出力電圧例えば4Vを、安定化回路Uによって降圧した電圧例えば3Vになっている。したがって、B点の電圧3VはA点の電圧0Vより大きいので、ダイオードD2が導通し、ダイオードD1が非導通になって、C点の電圧は3Vになる。なおこのとき、コンピュータ42のクロックは低速モードに設定されている。

【0040】時刻T1において、通常状態を指定する機器操作信号S1が入力回路41に送られてくる。従回路4Bは3Vでも動作する素子で構成されているため、待機状態でも機器操作信号S1を処理することができる。機器操作信号S1を受け取ったコンピュータ42はこれを処理し、機器制御信号S3を主回路3Aへ送る。

【0041】時刻T2において、コンピュータ42は動作状態選択信号S4として、例えば従回路の電源電圧と同じ3Vを出力する。この電圧を受けた抵抗RはnpnトランジスタQのベースに電流を流し、npnトランジスタQのコレクタとエミッタが導通してリレーRLは駆動される。駆動されたリレーRLは一定の時間の後に接点を導通させ、これにより主電源1Aの入力に電圧が供給される。

【0042】時刻T3において、入力電圧を供給された主電源1Aの出力電圧は5Vになり、主回路3Aに電源電圧5Vが供給されるため、動作状態は待機状態から通常状態に移行する。一方、B点の電圧は3Vのままなので、B点の電圧3VはA点の電圧5Vより小さくなり、ダイオードD2は非導通になって、ダイオードD1が導通する。よってC点の電圧は主電源1Aの出力電圧5Vになる。

【0043】時刻T4において、コンピュータ42はクロックを低速モードから高速モードに変える。すなわち

コンピュータ42は、供給される電源電圧が3Vから5Vに上昇するまでの一定の時間を持ってから、クロックを低速モードから高速モードに切り換える処理を行っている。これは、コンピュータ42の電源電圧が低い状態で、クロックを高速モードにしないための処理である。

【0044】この処理を行う理由を図6を使って説明する。図6はコンピュータの電源電流と電源電圧に関する特性の一例を示すグラフであり、縦軸は電源電流、横軸は電源電圧を表す。4本の特性曲線は各クロックモードに対応する特性を示すものである。また特性曲線の実線部分10は、各クロックモードにおいてコンピュータが正常に動作しうる電源電圧の変動範囲を示すものである。これによると、クロックモードが高速から低速になるほど電源の変動範囲は低電圧側に広がる傾向があることがわかる。すなわち高速モードにおける電源電圧の変動範囲は4.5から5.5Vであるが、低速モードにおいては3.5から5.5Vになっている。したがって、待機電力を減らすために待機状態におけるコンピュータの電源電圧を前記変動範囲の下限に設定したばあい、コンピュータは高速モードのクロックでは動作できなくなる。この問題を解決するために、コンピュータ42は、供給される電源電圧が低い状態ではクロックを高速モードにしないようにする上記の処理を行っている。

【0045】時刻T5において、待機状態を指定する機器操作信号S1が入力回路41に送られてくる。

【0046】時刻T6において、コンピュータ42はクロックを高速モードから低速モードに変える。すなわちコンピュータ42は、供給される電源電圧が5Vから3Vに低下する前に、クロックを高速モードから低速モードに切り換える処理を行っている。これも時刻T4における処理と同じく、コンピュータ42の電源電圧が低い状態で、クロックを高速モードにしないための処理である。

【0047】時刻T7において、コンピュータ42は動作状態選択信号S4を0Vにする。これによりnpnトランジスタQのコレクタ電流は流れなくなり、リレーRLは、一定時間後に接点を開放させ、主電源回路1Aの入力に対する電圧の供給が断たれる。

【0048】時刻T8において、入力を断たれた主電源1Aの出力は0Vに向かって低下し、主回路3へ電源電圧が供給されなくなるため、動作状態は通常状態から待機状態に移行する。上記によりA点の電圧が0Vになる一方、B点の電圧は3Vのままなので、B点の電圧3VはA点の電圧0Vより大きくなって、ダイオードD2は導通し、ダイオードD1は非導通になる。よってC点の電圧は3Vになる。

【0049】以上説明したように、第3の実施形態によれば、待機状態におけるコンピュータ42のクロックを高速モードから低速モードに設定することに加え、待機状態において従回路4に供給する電圧を通常状態より小

さくすることにより、コンピュータ42が待機状態で消費する電力を削減できる。

【0050】従回路4Bに供給する電圧を通常状態より小さくすることによって、コンピュータ42の消費する待機電力が削減される効果を、図7を使って説明する。図7はコンピュータの電源電流と電源電圧に関する特性の一例を示すグラフであり、縦軸は電源電流、横軸は電源電圧を表す。4本の特性曲線は各クロックモードに対応する特性を示すものである。これによると、クロックモードを一定にしておいて電源電圧を減少させると、電源電流も減少することがわかる。すなわちクロックが低速モードのときにおける電源電流は、電源電圧が5Vのときに3.2mAであるのに対し、3Vのとき1.8mAになっている。これを消費電力に換算すると、電源電圧が5Vのときに16mWであった消費電力が、電源電圧を3Vに下げることによって5.4mWにまで減少することがわかる。つまり、この図の例によれば、待機状態でクロックを低速モードにしたコンピュータの電源電圧を5Vから3Vに下げることにより、コンピュータの消費電力を3分の1程度に削減させる効果があることがわかる。

【0051】次に、本発明に係る電子機器の第4の実施形態について説明する。第4の実施形態の特徴は、第2の実施形態を示す図3と同じの回路構成で、待機状態におけるコンピュータ42のクロックを、スリープモードに設定することにある。スリープモードにおいて、コンピュータは動作を停止しており、そのときコンピュータの消費する電力は他のクロックモードに比べて最も少ない。

【0052】図5は第4の実施形態の動作を説明したタイミングチャートである。図5と図4にある同じ符号は、図3と同じの内容である。時刻T0において、動作状態選択信号S4は0Vに設定されており、リレーRLの接点は開放している。このため主電源1Aは出力せず、主回路3Aに電圧が供給されていないので、電子機器の動作状態は待機状態にある。上記により、A点の電圧は0Vになっており、一方B点の電圧は、待機動作用電源2の出力4Vを安定化回路Uによって降圧した3Vになっている。したがって、B点の電圧3VはA点の電圧0Vより大きくなって、ダイオードD2が導通し、ダイオードD1が非導通になって、C点の電圧は3Vになっている。なお、コンピュータ42のクロックはスリープモードに設定されており、コンピュータ42は動作を停止している。

【0053】時刻T1において、機器操作信号S1が入力回路41に送られてくると、入力回路41はコンピュータ42にスリープモードを解除するための信号を送る。この信号を受け取ったコンピュータ42は、クロックを低速モードに設定して、動作を開始する。これにより、コンピュータ42は入力回路41から送られてくる

機器操作信号S1の処理を行い、機器制御信号S3を主回路3Aへ送る。

【0054】時刻T2において、コンピュータ42は動作状態選択信号S4として3Vを出力する。この電圧を受けた抵抗RはnpnトランジスタQのベースに電流を流し、npnトランジスタQのコレクタとエミッタが導通してリレーRLは駆動される。駆動されたリレーRLは一定の時間の後に接点を導通させ、これにより主電源1Aの入力に電圧が供給される。時刻T3において、入力電圧を供給された主電源1Aの出力電圧は5Vになり、主回路3には電源電圧が供給されるため、動作状態は待機状態から通常状態に移行する。一方、B点の電圧は3Vのままなので、B点の電圧3VはA点の電圧5Vより小さくなって、ダイオードD2は非導通になり、ダイオードD1が導通する。よってC点の電圧は主電源1Aの出力5Vになる。

【0055】時刻T4において、コンピュータ42はクロックを低速モードから高速モードに変える。すなわちコンピュータ42は、供給される電源電圧が3Vから5Vに上昇するまでの一定の時間を待ってから、クロックを低速モードから高速モードに切り換える処理を行っている。これは、コンピュータ42の電源電圧が低い状態で、クロックを高速モードにしないための処理である。

【0056】時刻T5において、待機状態を指定する機器操作信号S1が入力回路41に送られてくる。

【0057】時刻T6において、コンピュータ42動作状態選択信号S4として0Vを出力する。続けてT7においてコンピュータ42はクロックを高速モードからスリープモードに変更し、コンピュータ42の動作を停止する。時刻T6の動作によって、リレーRLは接点を開放し、これにより主電源1Aの入力に対する電圧の供給が断たれて、主電源1Aの出力は0Vに向かって低下するが、時刻T6と時刻T7の動作が完了する時間は主電源1の出力が低下し始めるまでの時間より十分短いので、時刻T7の動作が完了したあとも、動作状態はしばらく通常状態を保持している。

【0058】時刻T8において、主電源1の出力は0Vに向かって低下し、主回路3Aへ電源電圧が供給されなくなるため、動作状態は通常状態から待機状態に移行する。上記によりA点の電圧が0Vになる一方、B点の電圧は3Vのままなので、B点の電圧3VがA点の電圧0Vより大きくなって、ダイオードD2は導通し、ダイオードD1は非導通になる。よってC点の電圧は3Vになる。

【0059】以上説明したように、第4の実施形態によれば、待機状態におけるコンピュータ42のクロックを

高速モードからスリープモードに設定することに加え、待機状態において従回路4Bに供給する電圧を通常状態より小さくすることにより、コンピュータ42が待機状態で消費する電力を削減できる。

【0060】従回路4Bに供給する電圧を通常状態より小さくすることによって、コンピュータ42の消費する待機電力が削減される効果を、図7を使って説明する。これによると、第2の実施形態における低速モードと同様に、クロックモードをスリープモードに設定して電源電圧を減少させると、電源電流も減少することがわかる。すなわちクロックが低速モードのときにおける電源電流は、電源電圧が5Vのときに2.3mAであるのに対し、3Vのとき1.2mAになっている。これを消費電力に換算すると、電源電圧が5Vのときに11.5mWであった消費電力が、電源電圧を3Vに下げることによって3.6mWにまで減少することがわかる。つまり、この図の例によれば、待機状態でクロックをスリープモードにしたコンピュータの電源電圧を5Vから3Vに下げることにより、コンピュータの消費電力を3分の1程度に削減させる効果があることが分かる。

【0061】

【発明の効果】本発明によれば、待機電力の削減できる電子機器を提供することができる。

【図面の簡単な説明】

【図1】図1は本発明の待機電力制御を行う電子機器の、第1の実施形態を示す回路図である。

【図2】図2は本発明の待機電力制御を行う電子機器の、第2の実施形態を示す回路図である。

【図3】図3は本発明の待機電力制御を行う電子機器の、第3の実施形態を示す回路図である

【図4】図4は本発明の待機電力制御を行う電子機器の、第3の実施形態の動作を示すタイミングチャートである。

【図5】図5は本発明の待機電力制御を行う電子機器の、第4の実施形態の動作を示すタイミングチャートである。

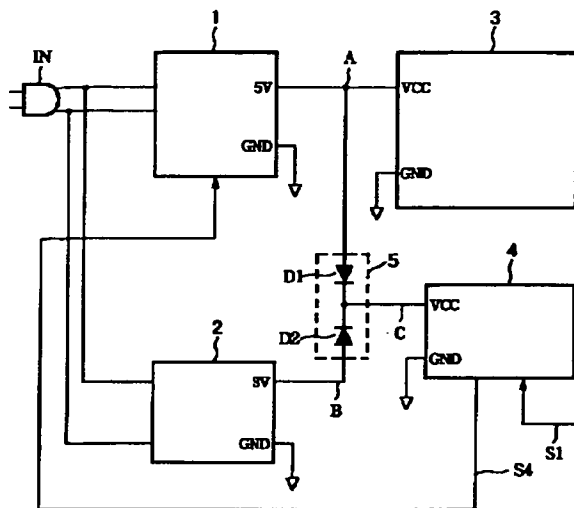
【図6】図6はクロックのモードに対するコンピュータの電源電圧と電源電流の関係、および電源電圧の変動範囲を示すグラフである。

【図7】図7はクロックのモードに対するコンピュータの電源電圧と電源電流の関係を示すグラフである。

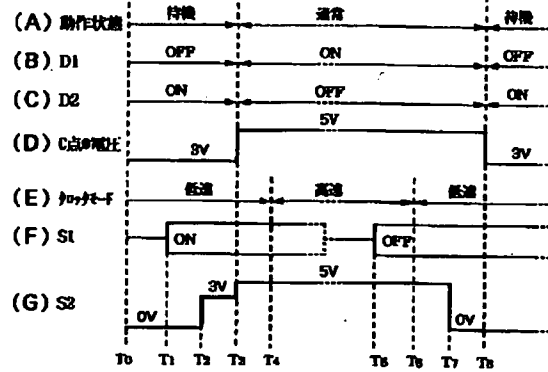
【符号の説明】

1, 1A…主電源、2, 2A…待機動作電源、3, 3A…主回路、4, 4A, 4B…従回路、5…電源切換部、6…入力スイッチ、S1…機器操作信号、S4…動作状態選択信号、S3…機器制御信号。

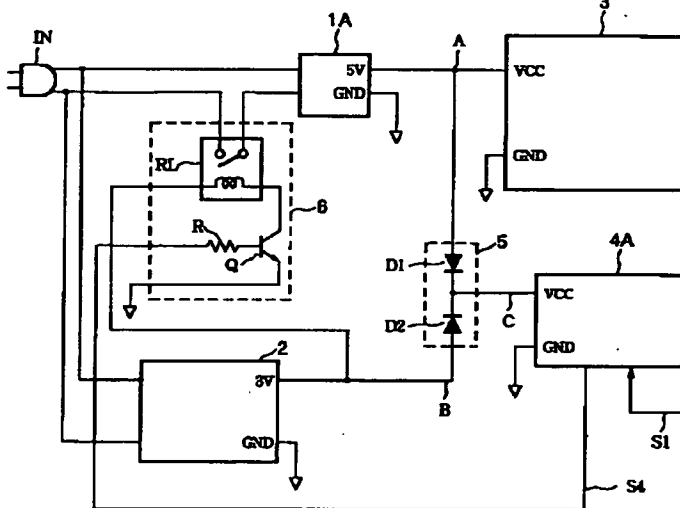
【図1】



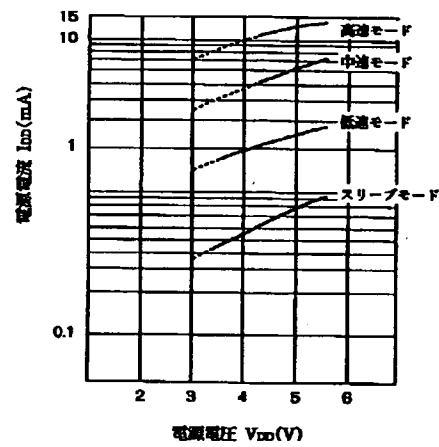
【図4】



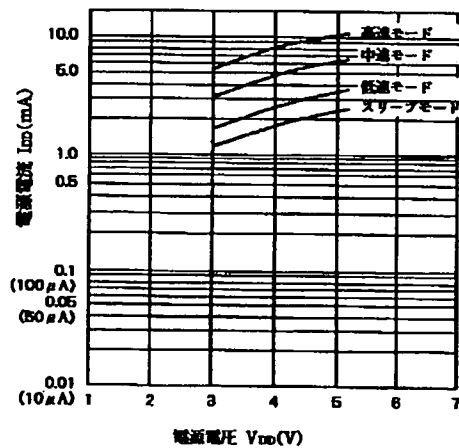
【図2】



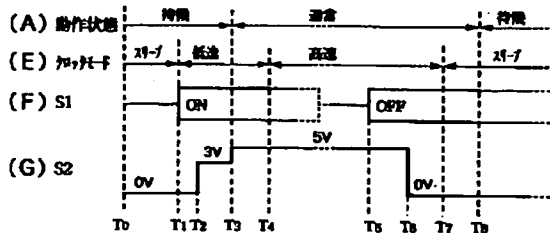
【図6】



【図7】



【図5】



[illegible]

(72)発明者 井上 浩之
東京都品川区北品川6丁目7番35号 ソニ
一株式会社内

(72)発明者 小沼 健一
東京都品川区北品川6丁目7番35号 ソニ
一株式会社内

F ターム(参考) 5B011 DA01 DB23 HH02 KK02 KK03
LL13 MA01
5B079 BA01 BB04 BB05 BC01
5G015 FA08 GB02 HA15 JA05 JA06
JA07 JA62

PAT-NO: JP02001178021A
DOCUMENT-IDENTIFIER: JP 2001178021 A
TITLE: ELECTRONIC APPARATUS

PUBN-DATE: June 29, 2001

INVENTOR-INFORMATION:

NAME	COUNTRY
AMANO, TOSHIO	N/A
OMURA, TADASHI	N/A
INOUE, HIROYUKI	N/A
KONUMA, KENICHI	N/A

ASSIGNEE-INFORMATION:

NAME	COUNTRY
SONY CORP	N/A

APPL-NO: JP11352228
APPL-DATE: December 10, 1999

INT-CL (IPC): H02J009/06 , G06F001/32 , G06F001/04

ABSTRACT:

PROBLEM TO BE SOLVED: To provide an electronic apparatus having a function controlling standby power in a standby state in the electronic apparatus having a slave circuit, whose lowest value of power supply voltage ensuring its operation in the standby state is lower than in the normal state.

SOLUTION: This electronic apparatus is provided with a main power supply 1 for receiving an operating condition selecting signal S4 selecting the normal state to output 5 V, and receiving the operating condition selecting signal S4 selecting the standby state to output 0 V, a standby operating power supply 2 for outputting 3 V, a main circuit 3 for receiving the 5 V from the main power supply 1 to perform operation in the normal state, and receiving the 0 V from the

main power supply 1 to stop its operation, a slave circuit 4 for receiving the 5 V from the main power supply 1 to perform operation in the normal state, and receiving the 3V from the standby operating power supply 2 to operate in the standby state, and a power source switching part 5 for receiving outputs from the main power source 1 and the standby operating power supply 2, and selecting and supplying the larger voltage thereof to supply it to the slave circuit 4.

COPYRIGHT: (C)2001,JPO

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-178021

(43)Date of publication of application : 29.06.2001

(51)Int.Cl.

H02J 9/06

G06F 1/32

G06F 1/04

(21)Application number : 11-352228

(71)Applicant : SONY CORP

(22)Date of filing : 10.12.1999

(72)Inventor : AMANO TOSHIO

OMURA TADASHI

INOUE HIROYUKI

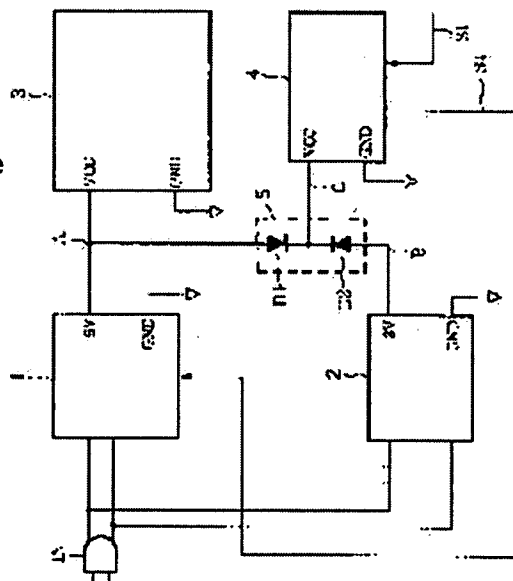
KONUMA KENICHI

(54) ELECTRONIC APPARATUS

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an electronic apparatus having a function controlling standby power in a standby state in the electronic apparatus having a slave circuit, whose lowest value of power supply voltage ensuring its operation in the standby state is lower than in the normal state.

SOLUTION: This electronic apparatus is provided with a main power supply 1 for receiving an operating condition selecting signal S4 selecting the normal state to output 5 V, and receiving the operating condition selecting signal S4 selecting the standby state to output 0 V, a standby operating power supply 2 for outputting 3 V, a main circuit 3 for receiving the 5 V from the main power supply 1 to perform operation in the normal state, and receiving the 0 V from the main power supply 1 to stop its operation, a slave circuit 4 for receiving the 5 V from the main power supply 1 to perform operation in the normal state, and receiving the 3V from the standby operating power supply 2 to operate in the standby state, and a power source switching part 5 for receiving outputs from the main power source 1 and the standby operating power supply 2, and selecting and supplying the larger voltage thereof to supply it



to the slave circuit 4.

LEGAL STATUS

[Date of request for examination] 08.03.2006

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The main power supply which is electronic equipment which has a standby condition and a normal state, outputs the 1st electrical potential difference when the operating state selection signal which chooses a normal state is received, and outputs the 2nd electrical potential difference when the operating state selection signal which chooses a standby condition is received, The power source for standby actuation which outputs the 3rd larger electrical potential difference smaller than the 1st electrical potential difference of the above than the 2nd electrical potential difference of the above, The main circuit which operates a normal state in response to the 1st electrical potential difference by the above-mentioned main power supply, and suspends actuation in response to the 2nd electrical potential difference by the above-mentioned main power supply, ***** which operates a normal state in response to the 1st electrical potential difference by the above-mentioned main power supply, and operates a standby condition in response to the 3rd electrical potential difference by the above-mentioned power source for standby actuation, It is electronic equipment which has the power-source change-over section which chooses a large electrical potential difference and is supplied to ***** either in response to the output of the above-mentioned main power supply, and the output of the above-mentioned power source for standby actuation.

[Claim 2] It is electronic equipment according to claim 1 which outputs the operating state selection signal which chooses a standby condition to the above-mentioned main power supply at the time of the signal with which the operating state selection signal which chooses a normal state is outputted to the above-mentioned main power supply at the time of the signal with which, as for the above-mentioned *****, reception and a device actuation signal specify a normal state for a device actuation signal, and a device actuation signal specifies a standby condition.

[Claim 3] The above-mentioned ***** is electronic equipment according to claim 2 which outputs an appliance control signal to the above-mentioned main circuit at the time of a normal state.

[Claim 4] The above-mentioned ***** is electronic equipment according to claim 1 which operates on the 1st frequency at the time of a normal state, and operates on the 2nd frequency lower than the 1st frequency concerned in a standby condition.

[Claim 5] The above-mentioned ***** is electronic equipment according to claim 3 which operates on the 1st frequency at the time of a normal state, and operates on the 2nd frequency lower than the 1st frequency concerned in a standby condition.

[Claim 6] It is electronic equipment according to claim 5 by which the above-mentioned main circuit operates on the 1st frequency at the time of a normal state, and, as for the above-mentioned *****, the above-mentioned appliance control signal synchronizes with the 1st frequency at the time of a normal state.

[Claim 7] The above-mentioned ***** is electronic equipment according to claim 5 which switches clock frequency to the 1st frequency after the passage of time set up beforehand after outputting the operating state selection signal which chooses the above-mentioned normal state to a main power supply, when the device actuation signal which specifies the above-mentioned normal state in a standby

condition is received.

[Claim 8] The above-mentioned ***** is electronic equipment according to claim 7 which outputs the operating state selection signal which chooses the above-mentioned standby condition to a main power supply after switching clock frequency to the 2nd frequency, when the device actuation signal which specifies the above-mentioned standby condition in a normal state is received.

[Claim 9] The above-mentioned ***** is electronic equipment according to claim 5 which outputs the operating state selection signal which chooses the above-mentioned normal state after switching clock frequency to the 3rd frequency lower than the 1st frequency to a main power supply, and switches clock frequency to the 1st frequency after the passage of time set up beforehand when the above-mentioned device actuation signal is received in a standby condition.

[Claim 10] The above-mentioned ***** is electronic equipment according to claim 9 which switches clock frequency to the 2nd frequency after outputting the operating state selection signal which chooses the above-mentioned standby condition to a main power supply, when the device actuation signal which specifies the above-mentioned standby condition in a normal state is received.

[Claim 11] The above-mentioned ***** is electronic equipment according to claim 6 which switches clock frequency to the 1st frequency after the passage of time set up beforehand after outputting the operating state selection signal which chooses the above-mentioned normal state to a main power supply, when the device actuation signal which specifies the above-mentioned normal state in a standby condition is received.

[Claim 12] The above-mentioned ***** is electronic equipment according to claim 11 which outputs the operating state selection signal which chooses the above-mentioned standby condition to a main power supply after switching clock frequency to the 2nd frequency, when the device actuation signal which specifies the above-mentioned standby condition in a normal state is received.

[Claim 13] The above-mentioned ***** is electronic equipment according to claim 6 which outputs the operating state selection signal which chooses the above-mentioned normal state after switching clock frequency to the 3rd frequency lower than the 1st frequency to a main power supply, and switches clock frequency to the 1st frequency after the passage of time set up beforehand when the above-mentioned device actuation signal is received in a standby condition.

[Claim 14] The above-mentioned ***** is electronic equipment according to claim 13 which switches clock frequency to the 2nd frequency after outputting the operating state selection signal which chooses the above-mentioned standby condition to a main power supply, when the device actuation signal which specifies the above-mentioned standby condition in a normal state is received.

[Claim 15] The main power supply which is electronic equipment which has a standby condition and a normal state, and outputs the 1st electrical potential difference to an input in response to a predetermined electrical potential difference, The input switch opened when the operating state selection signal which is connected between the input of the above-mentioned main power supply and the input which supplies an electrical potential difference to electronic equipment, flows when the operating state selection signal which chooses a normal state is received, and chooses a standby condition is received, The power source for standby actuation which outputs the 2nd electrical potential difference smaller than the 1st electrical potential difference of the above, The main circuit which operates a normal state in response to the 1st electrical potential difference by the above-mentioned main power supply, ***** which operates a normal state in response to the 1st electrical potential difference by the above-mentioned main power supply, and operates a standby condition in response to the 2nd electrical potential difference by the above-mentioned power source for standby actuation, It is electronic equipment which has the power-source change-over section which chooses a large electrical potential difference and is supplied to ***** either in response to the output of the above-mentioned main power supply, and the output of the above-mentioned power source for standby actuation.

[Claim 16] It is electronic equipment according to claim 15 which outputs the operating-state selection signal which chooses a standby condition to the above-mentioned input switch at the time of the signal with which the operating-state selection signal which chooses a normal state is outputted to the above-mentioned input switch at the time of the signal with which, as for the above-mentioned *****,

reception and a device actuation signal specify a normal state for a device actuation signal, and a device actuation signal specifies a standby condition.

[Claim 17] The above-mentioned ***** is electronic equipment according to claim 16 which outputs an appliance control signal to the above-mentioned main circuit at the time of a normal state.

[Claim 18] The above-mentioned ***** is electronic equipment according to claim 15 which operates on the 1st frequency at the time of a normal state, and operates on the 2nd frequency lower than the 1st frequency concerned in a standby condition.

[Claim 19] The above-mentioned ***** is electronic equipment according to claim 17 which operates on the 1st frequency at the time of a normal state, and operates on the 2nd frequency lower than the 1st frequency concerned in a standby condition.

[Claim 20] It is electronic equipment according to claim 19 by which the above-mentioned main circuit operates on the 1st frequency at the time of a normal state, and, as for the above-mentioned ***** , the above-mentioned appliance control signal synchronizes with the 1st frequency at the time of a normal state.

[Claim 21] The above-mentioned ***** is electronic equipment according to claim 19 which switches clock frequency to the 1st frequency after the passage of time set up beforehand after outputting the operating state selection signal which chooses the above-mentioned normal state to an input switch, when the device actuation signal which specifies the above-mentioned normal state in a standby condition is received.

[Claim 22] The above-mentioned ***** is electronic equipment according to claim 21 which outputs the operating state selection signal which chooses the above-mentioned standby condition to an input switch after switching clock frequency to the 2nd frequency, when the device actuation signal which specifies the above-mentioned standby condition in a normal state is received.

[Claim 23] The above-mentioned ***** is electronic equipment according to claim 19 which outputs the operating state selection signal which chooses the above-mentioned normal state after switching clock frequency to the 3rd frequency lower than the 1st frequency to an input switch, and switches clock frequency to the 1st frequency after the passage of time set up beforehand when the above-mentioned device actuation signal is received in a standby condition.

[Claim 24] The above-mentioned ***** is electronic equipment according to claim 23 which switches clock frequency to the 2nd frequency after outputting the operating state selection signal which chooses the above-mentioned standby condition to an input switch, when the device actuation signal which specifies the above-mentioned standby condition in a normal state is received.

[Claim 25] The above-mentioned ***** is electronic equipment according to claim 20 which switches clock frequency to the 1st frequency after the passage of time set up beforehand after outputting the operating state selection signal which chooses the above-mentioned normal state to an input switch, when the device actuation signal which specifies the above-mentioned normal state in a standby condition is received.

[Claim 26] The above-mentioned ***** is electronic equipment according to claim 25 which outputs the operating state selection signal which chooses the above-mentioned standby condition to an input switch after switching clock frequency to the 2nd frequency, when the device actuation signal which specifies the above-mentioned standby condition in a normal state is received.

[Claim 27] The above-mentioned ***** is electronic equipment according to claim 20 which outputs the operating state selection signal which chooses the above-mentioned normal state after switching clock frequency to the 3rd frequency lower than the 1st frequency to an input switch, and switches clock frequency to the 1st frequency after the passage of time set up beforehand when the above-mentioned device actuation signal is received in a standby condition.

[Claim 28] The above-mentioned ***** is electronic equipment according to claim 28 which switches clock frequency to the 2nd frequency after outputting the operating state selection signal which chooses the above-mentioned standby condition to an input switch, when the device actuation signal which specifies the above-mentioned standby condition in a normal state is received.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the electronic equipment which has a standby condition and a normal state, and relates to the electronic equipment which reduces the power consumption in a standby condition especially.

[0002]

[Description of the Prior Art] In recent years, it is one of the technical problems of the industrial world from a viewpoint of energy saving or an environmental problem that the electronic equipment in the condition of having left the anticipated-use condition reduces the power (henceforth standby power requirement) consumed in the condition [having energized]. therefore, the condition (henceforth a normal state) of carrying out the usual actuation -- in addition, the electronic equipment which established the condition (henceforth a standby condition) of having stopped the normal operating state and having held down consumption of power is manufactured.

[0003] When electronic equipment is conventionally set as a standby condition, the standby power requirement of electronic equipment is made to reduce by cutting off supply of supply voltage in the circuit (henceforth a main circuit) which is not operating in a standby condition. moreover, the case of the electronic equipment which has a computer in the circuit (henceforth *****) which operates in a standby condition -- the above-mentioned approach -- in addition, reduction of the further standby power requirement is aimed at by reducing the clock frequency of the computer of a standby condition, or suspending a clock.

[0004]

[Problem(s) to be Solved by the Invention] However, the power consumed in a standby condition with the electrical potential difference of the part which the minimum value of supply voltage which guarantees the normal actuation in the standby condition of ***** may decrease compared with the minimum value of a normal state, and decreased in that case was vainly consumed, in spite of having not been related to stable actuation of *****.

[0005] This invention is made in view of this situation, and the purpose is in offering the electronic equipment which can reduce the standby power requirement in a standby condition.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, by the electronic equipment of this invention The main power supply which outputs the 1st electrical potential difference in response to the operating state selection signal which chooses a normal state, and outputs the 2nd electrical potential difference in response to the operating state selection signal which chooses a standby condition, The power source for standby actuation which outputs the 3rd larger electrical potential difference smaller than the 1st electrical potential difference of the above than the 2nd electrical potential difference of the above, The 1st electrical potential difference by the above-mentioned main power supply is received, and it is actuation of a normal state. The main circuit which carries out and suspends actuation in response to the 2nd electrical potential difference by the above-mentioned main power supply, It is based on the above-mentioned main power supply.

***** which operates a normal state in response to the 1st electrical potential difference, and operates a standby condition in response to the 3rd electrical potential difference by the above-mentioned power source for standby actuation, It was made to have the power-source change-over section which chooses any or a large electrical potential difference and is supplied to ***** in response to the output of the above-mentioned main power supply, and the output of the above-mentioned power source for standby actuation.

[0007] The main power supply which outputs the 1st electrical potential difference to an input in response to a predetermined electrical potential difference by the electronic equipment of this invention, The input switch opened when the operating state selection signal which is connected between the input of the above-mentioned main power supply and the input which supplies an electrical potential difference to electronic equipment, flows when the operating state selection signal which chooses a normal state is received, and chooses a standby condition is received, The power source for standby

actuation which outputs the 2nd electrical potential difference smaller than the 1st electrical potential difference of the above, The main circuit which operates a normal state in response to the 1st electrical potential difference by the above-mentioned main power supply, The 2nd ** in response to the 1st electrical potential difference by the above-mentioned main power supply, operate a normal state, and according to the above-mentioned power source for standby actuation ***** which operates a standby condition in response to **, The output and for [above-mentioned] standby actuation It was made to have the power-source change-over section which chooses any or a large electrical potential difference and is supplied to ***** in response to the output of a power source. [of the above-mentioned main power supply]

[0008] Made the device actuation signal receive, the time of the signal with which a device actuation signal specifies a normal state made the operating state selection signal which chooses a normal state output to the above-mentioned main power supply, and the time of the signal with which a device actuation signal specifies a standby condition made the operating state selection signal which chooses a standby condition output to the above-mentioned main power supply in the above-mentioned ***** of the electronic equipment of this invention.

[0009] The above-mentioned main circuit was made to output an appliance control signal in the above-mentioned ***** of the electronic equipment of this invention at the time of a normal state.

[0010] It was made to operate on the 1st frequency at the time of a normal state, and was made to operate on the 2nd frequency lower than the 1st frequency concerned in a standby condition in the above-mentioned ***** of the electronic equipment of this invention. In addition, it was made to operate on the 1st frequency in the above-mentioned main circuit at the time of a normal state, and the above-mentioned appliance control signal was synchronized with the 1st frequency in the above-mentioned ***** at the time of a normal state.

[0011] When the device actuation signal which specifies the above-mentioned normal state in a standby condition is received in the above-mentioned ***** of the electronic equipment of this invention After outputting the operating state selection signal which chooses the above-mentioned normal state to a main power supply, When the device actuation signal which is made to switch clock frequency to the 1st frequency, and specifies the above-mentioned standby condition in a normal state after the passage of time set up beforehand is received Cycle of operation After switching a number to the 2nd

frequency, the operating state selection signal which chooses the above-mentioned standby condition was made to output to a main power supply. Or in the above-mentioned *****, when the above-mentioned device actuation signal is received in a standby condition After switching clock frequency to the 3rd frequency lower than the 1st frequency, the above-mentioned normal state is chosen. An operating state selection signal is outputted to a main power supply. After the passage of time set up beforehand, it is clock frequency. When the device actuation signal which is made to switch to the 1st frequency and specifies the above-mentioned standby condition in a normal state is received After outputting the operating state selection signal which chooses the above-mentioned standby condition to a main power supply, clock frequency was made to be switched to the 2nd frequency.

[0012] If the signal (henceforth an operating state selection signal) with which a main power supply chooses a normal state or a standby condition (both conditions are hereafter called operating state) is received according to the electronic equipment of this invention, electronic equipment will be set as a normal state or a standby condition according to the signal. At the time of a normal state, an electrical potential difference is supplied to a main circuit and ***** from a main power supply, and the usual actuation is performed. In a standby condition, an electrical potential difference lower than a normal state is supplied to a main circuit from a main power supply, and actuation of a main circuit stops. For this reason, electronic equipment is set as the standby condition which the usual actuation stopped. At this time, an electrical potential difference lower than the electrical potential difference of the main power supply of a normal state is supplied to ***** from the power source for standby actuation, and actuation of a standby condition is performed.

[0013] If the operating state selection signal which chooses a normal state as an operating state selection signal is specifically received, the 1st electrical potential difference will be supplied to a main circuit from a main power supply. Since the usual actuation is performed by this in a main circuit, electronic equipment is set as a normal state. On the other hand, the output voltage of a main power supply and the output voltage of the power source for standby actuation are received, any or a large electrical potential difference is chosen, and the power-source change-over section is supplied to *****.

Although the 1st electrical potential difference by the main power supply and the electrical potential difference by the power source for standby actuation are inputted into the electrical-potential-difference change-over section at this time, since the output voltage of the power source for standby actuation is set

up so that it may become smaller than the 1st electrical potential difference by the main power supply, the 1st electrical potential difference according to a main power supply in the output of the electrical-potential-difference change-over section is outputted. Therefore, the 1st electrical potential difference by the main power supply is supplied to *****.

[0014] Moreover, if the operating state selection signal which chooses a standby condition is received, the 2nd electrical potential difference lower than the 1st electrical potential difference by the main power supply and the electrical potential difference by the power source for standby actuation will be supplied to a main circuit from a main power supply. Since this 2nd electrical potential difference is lower than the supply voltage to which a main circuit can operate, actuation of a main circuit stops and, thereby, electronic equipment is set as a standby condition. Although the 2nd electrical potential difference by the main power supply and the electrical potential difference by the power source for standby actuation are inputted into the electrical-potential-difference change-over section at this time, since the output voltage of the power source for standby actuation is set up so that it may become larger than the 2nd electrical potential difference by the main power supply, the electrical potential difference according to the power source for standby actuation in the output of the electrical-potential-difference change-over section is outputted. Therefore, the electrical potential difference by the power source for standby actuation is supplied to *****.

[0015] According to the electronic equipment of this invention, if an input switch receives an operating state selection signal, electronic equipment will be set as a normal state or a standby condition according to the signal. At the time of a normal state, an electrical potential difference is supplied to a main circuit and ***** from a main power supply, and the usual actuation is performed. In a standby condition, an electrical potential difference is not supplied to a main circuit from a main power supply, but actuation of a main circuit stops. For this reason, electronic equipment is set as the standby condition which the usual actuation stopped. At this time, an electrical potential difference lower than the electrical potential difference of the main power supply of a normal state is supplied to ***** from the power source for standby actuation, and actuation of a standby condition is performed.

[0016] If the operating state selection signal with which an input switch chooses a normal state is specifically received, an input switch will flow and an electrical potential difference will be supplied to the input of a main power supply from the power-source input which supplies an electrical potential

difference to electronic equipment. Thereby, a main power supply outputs the 1st electrical potential difference. Since the main circuit to which the 1st electrical potential difference by the main power supply was supplied performs the usual actuation, electronic equipment is set as a normal state. On the other hand, the output voltage of a main power supply and the output voltage of the power source for standby actuation are received, any or a large electrical potential difference is chosen, and the power-source change-over section is supplied to *****. Although the 1st electrical potential difference by the main power supply and the 2nd electrical potential difference by the power source for standby actuation are inputted into the electrical-potential-difference change-over section at this time, since the 2nd electrical potential difference by the power source for standby actuation is set up so that it may become smaller than the 1st electrical potential difference by the main power supply, the 1st electrical potential difference according to a main power supply in the output of the electrical-potential-difference change-over section is outputted. Therefore, the 1st electrical potential difference by the main power supply is supplied to *****.

[0017] Moreover, if the operating state selection signal with which an input switch chooses a standby condition is received, an input switch becomes non-****, and since the electrical potential difference currently supplied to the input of a main power supply from the power-source input is severed by this, the output voltage of a main power supply will decline to 0V. Since an electrical potential difference falls to 0V, the electrical potential difference supplied from a main power supply suspends actuation of a main circuit, and electronic equipment is set as a standby condition. Although the 2nd electrical potential difference by electrical-potential-difference 0V and the power source for standby actuation by the main power supply is inputted into the electrical-potential-difference change-over section at this time, since the output voltage of the power source for standby actuation is larger than the electrical potential difference by the main power supply which fell to 0V, the 2nd electrical potential difference according to the power source for standby actuation in the output of the electrical-potential-difference change-over section is outputted. Therefore, the 2nd electrical potential difference by the power source for standby actuation is supplied to *****.

[0018]

[Embodiment of the Invention] Drawing 1 is the circuit diagram showing the 1st operation gestalt of the electronic equipment concerning this invention. drawing 1 -- setting -- 1 -- as for a main circuit and 4, ***** and 5 show D1,

and, as for the power source for standby actuation of a dc output, and 3, the main power supply of a dc output and 2 show diode, respectively, as for the power-source change-over section and D2. Moreover, in a power-source input for IN to supply power to electronic equipment, and A, B and C, the node of a circuit and S1 show a device actuation signal, and S4 shows the operating state selection signal, respectively.

[0019] A main power supply 1 has received operating state selection-signal S4 from ***** 4 while it operates in response to an electrical potential difference from the power-source input IN and outputs direct current voltage to a main circuit 3 and the power-source change-over section 5. At the time of the signal with which operating state selection-signal S4 chooses a normal state, a main power supply 1 outputs the direct current voltage which operates a main circuit, 5V [for example,], and outputs an electrical potential difference with a main power supply 1 lower than a normal state, 0V [for example,], at the time of the signal with which operating state selection-signal S4 chooses a standby condition. The power source 2 for standby actuation operates in response to an electrical potential difference from the power-source input IN, is larger than the electrical potential difference which a main power supply 1 outputs in a standby condition smaller than the electrical potential difference outputted in a normal state, for example, outputs the direct current voltage of 3V to the power-source change-over section 5. The negative side terminal of the output of a main power supply 1 and the power source 2 for standby actuation is connected to the common gland of a circuit.

[0020] The power-source change-over section 5 receives the electrical potential difference from a main power supply 1 and the power source 2 for standby, compares both electrical potential difference, and is outputting any or a large electrical potential difference to ***** 4. This electrical-potential-difference change-over section specifically consists of diodes D1 and D2. The anode of diode D1 receives the electrical potential difference from a main power supply 1, and the anode of diode D2 has received the electrical potential difference from the power source 2 for standby actuation, respectively. It connects, the node serves as an output of the electrical-potential-difference change-over section, and both the cathodes of these two diodes are outputting the electrical potential difference to ***** 4. In addition, diodes D1 and D2 are changed into the switch by semiconductor devices, such as a transistor, and the power-source change-over section 5 can also constitute them.

[0021] A main circuit 3 operates in response to an electrical potential

difference at the time of a normal state from a main power supply 1. ***** 4 processes this in response to the device actuation signal S1, and outputs operating state selection-signal S4 to a main power supply 1 while it operates in response to an electrical potential difference from the power-source change-over section 5. Operating state selection-signal S4 is a signal which chooses the operating state of electronic equipment as either a normal state or a standby condition. The grand terminal of a main circuit 3 and ***** 4 is connected to the common gland of a circuit.

[0022] Next, the actuation in the above configuration is explained. If ***** 4 receives the device actuation signal S1 which specifies a standby condition, ***** 4 will output operating state selection-signal S4 which chooses a standby condition to a main power supply 1. The main power supply 1 which received said signal outputs 0V as output voltage. In electrical-potential-difference 0V by this main power supply 1, since the main circuit 3 which has received the electrical potential difference from the main power supply 1 cannot operate, it suspends actuation. When a main circuit 3 suspends actuation, electronic equipment will be in a standby condition. While the electrical potential difference of the A point which is the output of a main power supply 1 is set to 0V, it has become the electrical potential difference by the power source 2 for standby actuation, 3V [for example,], at the B point, and the electrical potential difference of a B point becomes larger than the electrical potential difference of an A point. Since diode D2 flows and diode D1 is un-flowing by this, supply voltage 3V of the power source 2 for standby actuation are supplied to ***** 4 through diode D2. Since ***** 4 is constituted from a component for which supply voltage 3V operate, it operates normally.

[0023] If ***** 4 receives the device actuation signal S1 which specifies a normal state, ***** 4 will output operating state selection-signal S4 which chooses a normal state to a main power supply 1. The main power supply 1 which received said signal outputs 5V as output voltage. The main circuit 3 which has received the electrical potential difference from the main power supply 1 starts actuation by electrical-potential-difference 5V by this main power supply 1. When a main circuit 3 carries out the usual actuation, electronic equipment will be in a normal state. While the electrical potential difference of the A point which is the output of a main power supply 1 is set to 5V, it is still electrical-potential-difference 3V by the power source 2 for standby actuation, and the electrical potential difference of a B point becomes smaller than the electrical potential difference of an A point at a B point.

Since diode D1 flows and diode D2 is un-flowing by this, supply voltage 3V of a main power supply 1 are supplied to ***** 4 through diode D1. Since ***** 4 is constituted from a component for which supply voltage 5V operate, it operates normally.

[0024] As explained above, according to the 1st operation gestalt, the minimum value of supply voltage required for actuation of ***** 4 can make small supply voltage supplied to ***** 4 compared with a normal state in a standby condition in a standby condition, when low compared with the minimum value of supply voltage required for actuation of a main circuit 3 at the time of a normal state. Thereby, since not only the main circuit 3 but the power consumption of ***** 4 is reducible, compared with the case where it does not have a standby-power-requirement control function by this invention, the standby power requirement of electronic equipment is reducible.

[0025] Moreover, when ***** 4 operates with the clock frequency set up beforehand, the standby power requirement of electronic equipment can be made to reduce further in the 1st operation gestalt by adding the circuit which changes a clock frequency into ***** 4 according to supply voltage. ***** 4 sets a clock as the 1st frequency required for actuation of a normal state, when ***** 4 receives the supply voltage of a normal state, and when the supply voltage of a standby condition is received, specifically, it has the circuit which changes a clock into the 2nd frequency lower than the 1st frequency. The frequency of the clock in a standby condition falls by adding the aforementioned circuit to ***** 4, and thereby, since the amount per unit time amount of the power loss produced according to the charge and discharge current which flows to the capacity component of each part of ***** 4 to one period of a clock decreases, the standby power requirement of electronic equipment is reducible.

[0026] Next, intermediary explanation is given at the 2nd operation gestalt of the electronic equipment concerning this invention. Drawing 2 is the circuit diagram showing the 2nd operation gestalt. The same sign of drawing 1 and drawing 2 expresses the same contents. drawing 2 -- setting -- 1A -- in an input switch and RL, a relay and Q show a npn transistor and, as for the main power supply of a dc output, and 4A, R shows [***** and 6] resistance, respectively.

[0027] The input of main power supply 1A has received the electrical potential difference from the power-source input IN through the input switch 6. When the input switch 6 flows, main power supply 1A operates and outputs direct current voltage, 5V [for example,], to a main circuit 3 and the power-

source change-over section 5. The negative side terminal of the output of main power supply 1A is connected to the common gland of a circuit.

[0028] ***** 4A processes this in response to the device actuation signal S1, and outputs operating state selection-signal S4 to the input switch 6 while it operates in response to an electrical potential difference from the power-source change-over section 5. Operating state selection-signal S4 is a signal which chooses the operating state of electronic equipment as either a normal state or a standby condition. The gland of a main circuit is connected to the common gland of a circuit.

[0029] It connects between the power-source input IN and main power supply 1A, and the input switch 6 gets down, and carries out the power-source input IN and electrical installation between main power supply 1A to a flow or un-flowing according to the operating state selection signal 4 received from *****4A. At the time of the signal with which the operating state selection signal 4 chooses a standby condition, the input switch 6 flows and the input switch 6 is un-flowing at the time of the signal which chooses a standby condition. The input switch 6 is specifically constituted by npn-transistor Q Relay RL and for a relay drive, and base resistance R. The contact of Relay RL is connected between the power-source input IN and main power supply 1A, one [which drives a contact] terminal of a coil has received the electrical potential difference from the power source 2 for standby actuation, and the other-end child is connected to the collector of npn-transistor Q. The contact of Relay RL flows through a contact, when the current of the convention to a drive coil is passed. The emitter of npn-transistor Q is connected to the common gland of a circuit, and the base has received operating state selection-signal S4 from *****4A through Resistance R. In addition, even if it receives the electrical potential difference for driving Relay RL from the place which is within the limits of an electrical potential difference required for the drive of not only the output of the power source 2 for standby actuation but a relay, and can usually supply an electrical potential difference also in the state of any with standby, for example, C point etc., it is possible. Moreover, Relay RL is transposed to the switch by semiconductor devices, such as a transistor, and the input switch 6 can also constitute it.

[0030] Next, the actuation in the above configuration is explained. If ***** 4A receives the device actuation signal S1 which specifies a standby condition, since operating state selection-signal S4 will be set to 0V and the base current of npn-transistor Q will be drained, between the collector emitters of npn-transistor Q will be un-flowing, the drive coil current of Relay RL will

not flow, and Relay RL is cut. If Relay RL cuts, the input voltage to main power supply 1A is severed, the output voltage of main power supply 1A will decline toward 0V, and the electrical potential difference of a B point will become larger than the electrical potential difference of an A point. Since diode D2 flows and diode D1 is un-flowing by this, the output voltage of the power source 2 for standby actuation, 3V [for example,], is supplied to *****4A through diode D2. Since supply voltage is constituted from a component for which 3V operate, ***** 4A operates normally. Since supply of supply voltage is cut off and actuation of a circuit stops a main circuit 3, electronic equipment will be in a standby condition.

[0031] If ***** 4A receives the device actuation signal S1 which specifies a normal state, since the base current of npn-transistor Q flows to Resistance R, between the emitter-collector of npn-transistor Q will flow and a current will flow to the drive coil of Relay RL with the electrical potential difference of operating state selection-signal S4, the contact of Relay RL flows. If Relay RL flows, input voltage will be supplied to main power supply 1A, and the electrical potential difference of an A point will turn into the output voltage of a main power supply, 5V [for example,]. Since output voltage 5V of a main power supply 1 are set up more greatly than output voltage 3V of the power source 2 for standby actuation, the electrical potential difference of a B point becomes smaller than the electrical potential difference of an A point. Since diode D2 is un-flowing and diode D1 flows by this, the supply voltage of main power supply 1A is supplied to *****4A through diode D1. Since supply voltage is constituted from a component for which 5V operate, ***** 4A operates normally. Electrical-potential-difference 5V of main power supply 1A will be supplied, a main circuit 3 will start actuation, and electronic equipment will be in a normal state.

[0032] As explained above, even if it does not have the function in which main power supply 1A controls output voltage like the 1st operation gestalt according to the 2nd operation gestalt, the output voltage of main power supply 1A is controllable by forming the input switch 6 of the easy configuration by relay etc. in the input side of main power supply 1A. Thereby, in a standby condition, when low compared with the minimum value of the supply voltage which needs the minimum value of supply voltage required for actuation of ***** 4A for actuation of a main circuit 3 at the time of a normal state, compared with a normal state, things can do small supply voltage supplied to ***** 4A in a standby condition. Therefore, since not only the main circuit 3 but the power consumption of ***** 4A is

reducible in a standby condition, compared with the case where it does not have a standby-power-requirement control function by this invention, the standby power requirement of electronic equipment is reducible.

[0033] Moreover, when ***** 4 operates with the clock frequency set up beforehand, the standby power requirement of electronic equipment can be made to reduce further in the 2nd operation gestalt by adding the circuit which changes a clock frequency into ***** 4A according to supply voltage.

***** 4A sets a clock as the 1st frequency required for actuation of a normal state, when ***** 4A receives the supply voltage of a normal state, and when the supply voltage of a standby condition is received, specifically, it has the circuit which changes a clock into the 2nd frequency lower than the 1st frequency. The frequency of the clock in a standby condition falls by adding the aforementioned circuit to ***** 4A, and since the amount per unit time amount of the power loss produced according to the charge and discharge current which flows to the capacity component of each part of ***** 4A to one period of a clock decreases, the standby power requirement of electronic equipment is reducible.

[0034] Next, lessons is taken from the 3rd operation gestalt of the electronic equipment concerning this invention, and it explains. Drawing 3 is the circuit diagram showing the 3rd operation gestalt. The same sign of drawing 2 and drawing 3 expresses the same contents. drawing 3 -- setting -- 2A -- the power source for standby actuation of a dc output, and 3A -- a main circuit and 4B -- ***** and 41 -- an input circuit and 42 -- a computer and 43 -- a capacitor and T show a transformer and, as for nonvolatile memory and 44, in diode, and C1 and C2, U shows [a reset circuit and D3] the electrical-potential-difference stabilization circuit, respectively. Moreover, S3 shows the appliance control signal.

[0035] Power-source 2A for standby actuation operates in response to an electrical potential difference from the power-source input IN, is larger than the electrical potential difference which main power supply 1A outputs in a standby condition smaller than the electrical potential difference outputted in a normal state, for example, outputs the direct current voltage of 3V to the power-source change-over section 5. The negative side terminal of the output of power-source 2A for standby actuation is connected to the common gland of a circuit. This power-source 2A for standby actuation is specifically constituted by Transformer T, diode D3, capacitors C1 and C2, and the electrical-potential-difference stabilization circuit U1. The upstream is connected to the power-source input IN, and one terminal of a secondary is

connected [Transformer T] to the anode of diode D3 for the other-end child in the gland where a circuit is common. The anode is connected to the secondary terminal of Transformer T, and the cathode is connected to the input of a capacitor C1 and the electrical-potential-difference stabilization circuit U, and the drive coil of Relay RL for diode D3. One terminal is connected to the cathode of diode D3 for the other-end child in the common gland, and, as for a capacitor C1, the direct current voltage which carried out smooth, 4V [for example,], generates the electrical potential difference rectified by the both ends for Transformer T and diode D3. Although these electrical-potential-difference 4V are supplied to the drive coil of Relay RL as an electrical potential difference for a relay drive in drawing 3 , if it is the range of the electrical potential difference which can drive Relay RL, it is also possible to supply an electrical potential difference from a B point or C point. The electrical-potential-difference stabilization circuit U lowers the pressure of and stabilizes electrical-potential-difference 4V received from the cathode of diode D3, and outputs direct current voltage, 3V [for example,], to the electrical-potential-difference change-over section 5. As for a capacitor C2, an other-end child removes [one terminal] the high frequency component which is connected in the gland where a circuit is common and is contained in the output voltage of the electrical-potential-difference stabilization circuit U to the output of the electrical-potential-difference stabilization circuit U.

[0036] Main circuit 3A receives an electrical potential difference from main power supply 1A, and operates at the time of a normal state. Moreover, actuation according to the device actuation signal S1 sent from the outside of electronic equipment is carried out with the appliance control signal S3 received from *****4B. The gland of main circuit 3A is connected to the common gland of a circuit. ***** 4B -- the power-source change-over section 5 to an electrical potential difference -- winning popularity -- usually - - ** -- standby -- it operates also in the state of any. Moreover, while processing this in response to the device actuation signal S1 and outputting operating state selection-signal S4 to the input switch 6, the device actuation signal S3 is outputted to main circuit 3A. The gland of ***** 4B is connected to the common gland of a circuit. Operating state selection-signal S4 is a signal which chooses the operating state of electronic equipment as either a normal state or a standby condition. The appliance control signal S3 is a signal for the signal with which ***** 4B processed and generated the device actuation signal S1, and ***** 4B to control main circuit 3A. In addition, when operating main circuit 3A and ***** 4B with the same clock,

it is possible to output the control signal which synchronized with the clock of ***** 4B and this to main circuit 3A as an appliance control signal S3.

Thereby, in a normal state, main circuit 3A operates with the clock of the same frequency which synchronized with ***** 4B. Moreover, the appliance control signal S3 synchronizes with the clock of ***** 4B.

[0037] This ***** 4B specifically consists of each circuit of an input circuit 41, a computer 42, nonvolatile memory 43, and a reset circuit 44. The input circuit 41 has sent to the computer 42 the signal which processed the device actuation signal S1. It outputs operating state selection-signal S4 to an input switch, and is controlling the operating state of electronic equipment while a computer 42 processes the signal received from the input circuit, generates the appliance control signal S3 and outputs it to main circuit 3A. Moreover, the signal which initializes actuation of a computer is received from a reset circuit. Furthermore, the signal about writing and read-out of the information about operating state is inputted or outputted between nonvolatile memory 43, for example. The reset circuit 44 has sent the signal for resetting a computer at the time of the injection of the power source of electronic equipment to the computer 42. The information on current operating state is received from a computer 42, and nonvolatile memory 43 stores it. And when it is again supplied after the electrical potential difference supplied to electronic equipment was intercepted, a computer 42 receives said information before intercepting an electrical potential difference from nonvolatile memory 43, and returns to the condition before an electrical potential difference is intercepted.

[0038] Next, actuation by the above configuration is explained. Drawing 4 is a timing chart explaining actuation of the circuit of drawing 3. (A) expresses change of operating state, i.e., a standby condition, or a normal state. (B) and (C) express change of the flow of the switch-on of diodes D1 and D2, i.e., diode, or not flowing. The notation of ON of drawing and OFF means that ON does not flow through a flow and OFF. (D) expresses change of the electrical potential difference of C point of drawing 2, i.e., the supply voltage supplied to ***** 4B. (E) expresses change of the clock frequency in the clock mode 42, i.e., a computer. (F) expresses change of the device actuation signal S1 sent to an input circuit 41. The device actuation signal S1 is a signal of time series sent by infrared radiation from an external device. It means that the signal with which ON specifies a normal state in the notation of ON of drawing and OFF, and the signal with which OFF specifies a standby condition have been sent. (G) expresses change of the electrical potential

difference which controls closing motion of operating state selection-signal S46 inputted into the input switch 6, i.e., an input switch. T0-T8 express time of day.

[0039] Actuation of the circuit of drawing 3 which shows the 3rd operation gestalt is explained using the timing diagram of drawing 4. In time of day T0, operating state selection-signal S4 is set as 0V, and the contact of Relay RL is opened wide. For this reason, since main power supply 1A does not output and the electrical potential difference is not supplied to main circuit 3A, the operating state of electronic equipment is in a standby condition. The electrical potential difference of a B point has turned into the electrical potential difference, 3V [for example,], which lowered the pressure of the output voltage of the half wave rectifier circuit which Transformer T, diode D3, and a capacitor C1 constitute, 4V [for example,], by the stabilization circuit U. Therefore, since electrical-potential-difference 3V of a B point are larger than electrical-potential-difference 0V of an A point, diode D2 flows, diode D1 is un-flowing and the electrical potential difference of C point is set to 3V. In addition, the clock of a computer 42 is set as the slow mode at this time.

[0040] In time of day T1, the device actuation signal S1 which specifies a normal state is sent to an input circuit 41. Since ***** 4B consists of components which operate [3V or], it can process the device actuation signal S1 also in the state of standby. The computer 42 which received the device actuation signal S1 processes this, and sends the appliance control signal S3 to main circuit 3A.

[0041] In time of day T2, a computer 42 outputs the 3V [same] as the supply voltage of ***** as operating state selection-signal S4. A sink, and the collector and emitter of npn-transistor Q flow through a current at the base of npn-transistor Q, and the resistance R which received this electrical potential difference drives Relay RL. The driven relay RL makes it flow through a contact after fixed time amount, and, thereby, an electrical potential difference is supplied to the input of main power supply 1A.

[0042] In time-of-day T3, since the output voltage of main power supply 1A to which input voltage was supplied is set to 5V and supply voltage 5V are supplied to main circuit 3A, operating state shifts to a normal state from a standby condition. On the other hand, since the electrical potential difference of a B point is still 3V, electrical-potential-difference 3V of a B point become smaller than electrical-potential-difference 5V of an A point, diode D2 is un-flowing and diode D1 flows through it. Therefore, the electrical potential

difference of C point is set to output voltage 5V of main power supply 1A. [0043] In time-of-day T four, a computer 42 changes a clock into fast mode from a slow mode. That is, a computer 42 is performing processing which switches a clock to fast mode from a slow mode, after waiting for fixed time amount until the supply voltage supplied rises from 3V to 5V. This is in the condition that the supply voltage of a computer 42 is low, and is processing for not making a clock into fast mode.

[0044] The reason for performing this processing is explained using drawing 6. Drawing 6 is a graph which shows an example of the property about the power-source current and supply voltage of a computer, an axis of ordinate expresses a power-source current, and an axis of abscissa expresses supply voltage. Four characteristic curves show the property corresponding to each KUROKKUMO-DO. Moreover, the continuous-line part of a characteristic curve shows the fluctuation range of supply voltage where a computer can operate normally in each KUROKKUMO-DO. According to this, it turns out that the fluctuation range of a power source tends to be large on a low-battery side, so that KUROKKUMO-DO becomes a low speed from a high speed. That is, although the fluctuation range of the supply voltage in fast mode is 5.5V from 4.5, it is 5.5V from 3.5 in the slow mode. In order to reduce standby power requirement, when the supply voltage of the computer in a standby condition is set as the minimum of said fluctuation range, it becomes impossible therefore, for a computer to operate with the clock of fast mode. In order to solve this problem, the computer 42 is performing the above-mentioned processing which is made not to make a clock fast mode in the condition that the supply voltage supplied is low.

[0045] It sets time-of-day T5 and the device actuation signal S1 which specifies a standby condition is sent to an input circuit 41.

[0046] In time of day T6, a computer 42 changes a clock into a slow mode from fast mode. That is, the computer 42 is performing processing which switches a clock to a slow mode from fast mode, before the supply voltage supplied falls to 3V from 5V. This is also in the condition same with the processing in time-of-day T four that the supply voltage of a computer 42 is low, and is processing for not making a clock into fast mode.

[0047] In time of day T7, a computer 42 sets operating state selection-signal S4 to 0V. Thereby, the collector current of npn-transistor Q will not flow, Relay RL makes a contact open wide after fixed time amount, and supply of the electrical potential difference to the input of main power supply circuit 1A is cut off.

[0048] In time of day T8, since the output of main power supply 1A which had the input severed declines toward 0V and supply voltage is no longer supplied to a main circuit 3, operating state shifts to a standby condition from a normal state. Since the electrical potential difference of a B point is still 3V while the electrical potential difference of an A point is set to 0V by the above, electrical-potential-difference 3V of a B point become larger than electrical-potential-difference 0V of an A point, diode D2 flows and diode D1 is un-flowing. Therefore, the electrical potential difference of C point is set to 3V.

[0049] As explained above, according to the 3rd operation gestalt, a computer 42 can reduce the power consumed in the state of standby by making smaller than a normal state the electrical potential difference which supplies the clock of the computer 42 in a standby condition to ***** 4 in a standby condition from fast mode in addition to setting it as a slow mode.

[0050] By making smaller than a normal state the electrical potential difference supplied to ***** 4B, drawing 7 which explains the effectiveness that the standby power requirement which a computer 42 consumes is reduced, using drawing 7 is a graph which shows an example of the property about the power-source current and supply voltage of a computer, an axis of ordinate expresses a power-source current, and an axis of abscissa expresses supply voltage. Four characteristic curves show the property corresponding to each KUROKKUMO-DO. It turns out that clock mode is fixed according to this, and a power-source current will also decrease if supply voltage is decreased. Namely, the power-source current in case a clock is a slow mode is 1.8mA to being 3.2mA at the time of 3V, when supply voltage is 5V. When this is converted into power consumption, it turns out that the power consumption which was 16mW when supply voltage was 5V decreases even to 5.4mW by lowering supply voltage to 3V. That is, according to the example of this drawing, ** which lowers the supply voltage of the computer which made the clock the slow mode in the state of standby to 3V from 5V shows that it is effective in making about 1/3 reduce the power consumption of a computer.

[0051] Next, lessons is taken from the 4th operation gestalt of the electronic equipment concerning this invention, and it explains. The description of the 4th operation gestalt is the same circuitry as drawing 3 which shows the 2nd operation gestalt, and is to set the clock of the computer 42 in a standby condition as a sleep mode. In a sleep mode, a computer has least power which has suspended actuation and a computer consumes then compared with other

clock modes.

[0052] Drawing 5 is a timing chart explaining actuation of the 4th operation gestalt. The same signs in drawing 5 and drawing 4 are the same contents as drawing 3. In time of day T0, operating state selection-signal S4 is set as 0V, and the contact of Relay RL is opened wide. For this reason, since main power supply 1A does not output and the electrical potential difference is not supplied to main circuit 3A, the operating state of electronic equipment is in a standby condition. By the above, the electrical potential difference of an A point is 0V, and, on the other hand, the electrical potential difference of a B point has become 3V which lowered the pressure of output 4V of the power source 2 for standby actuation by the stabilization circuit U. Therefore, it becomes larger [electrical-potential-difference 3V of a B point] than electrical-potential-difference 0V of an A point, and diode D2 flows, diode D1 is un-flowing and the electrical potential difference of C point has become 3V. In addition, the clock of a computer 42 is set as the sleep mode, and the computer 42 has suspended actuation.

[0053] In time of day T1, if the device actuation signal S1 is sent to an input circuit 41, an input circuit 41 will send the signal for canceling a sleep mode to a computer 42. The computer 42 which received this signal sets a clock as a slow mode, and starts actuation. Thereby, a computer 42 processes the device actuation signal S1 sent from an input circuit 41, and sends the appliance control signal S3 to main circuit 3A.

[0054] In time of day T2, a computer 42 outputs 3V as operating state selection-signal S4. A sink, and the collector and emitter of npn-transistor Q flow through a current at the base of npn-transistor Q, and the resistance R which received this electrical potential difference drives Relay RL. The driven relay RL makes it flow through a contact after fixed time amount, and, thereby, an electrical potential difference is supplied to the input of main power supply 1A. In time-of-day T3, since the output voltage of main power supply 1A to which input voltage was supplied is set to 5V and supply voltage is supplied to a main circuit 3, operating state shifts to a normal state from a standby condition. On the other hand, since the electrical potential difference of a B point is still 3V, electrical-potential-difference 3V of a B point become smaller than electrical-potential-difference 5V of an A point, diode D2 is un-flowing and diode D1 flows through it. Therefore, the electrical potential difference of C point is set to output 5V of main power supply 1A.

[0055] In time-of-day T four, a computer 42 changes a clock into fast mode from a slow mode. That is, a computer 42 is performing processing which

switches a clock to fast mode from a slow mode, after waiting for fixed time amount until the supply voltage supplied rises from 3V to 5V. This is in the condition that the supply voltage of a computer 42 is low, and is processing for not making a clock into fast mode.

[0056] It sets time-of-day T5 and the device actuation signal S1 which specifies a standby condition is sent to an input circuit 41.

[0057] In time of day T6, 0V are outputted as computer 42 operating-state selection-signal S4. Continuously, in T7, a computer 42 changes a clock into a sleep mode from fast mode, and suspends actuation of a computer 42.

Although Relay RL opens a contact wide, supply of the electrical potential difference to the input of main power supply 1A is cut off by this and the output of main power supply 1A declines toward 0V by actuation of time of day T6. Since the time amount which actuation of time of day T6 and time of day T7 completes is shorter than time amount until the output of a main power supply 1 begins to decline enough, also after actuation of time of day T7 is completed, as for operating state, the normal state is held for a while.

[0058] In time of day T8, since the output of a main power supply 1 declines toward 0V and supply voltage is no longer supplied to main circuit 3A, operating state shifts to a standby condition from a normal state. Since the electrical potential difference of a B point is still 3V while the electrical potential difference of an A point is set to 0V by the above, electrical-potential-difference 3V of a B point become larger than electrical-potential-difference 0V of an A point, diode D2 flows and diode D1 is un-flowing.

Therefore, the electrical potential difference of C point is set to 3V.

[0059] As explained above, according to the 4th operation gestalt, a computer 42 can reduce the power consumed in the state of standby by making smaller than a normal state the electrical potential difference which supplies the clock of the computer 42 in a standby condition to ***** 4B in a standby condition from fast mode in addition to setting it as a sleep mode.

[0060] By making smaller than a normal state the electrical potential difference supplied to ***** 4B explains the effectiveness that the standby power requirement which a computer 42 consumes is reduced, using drawing 7. When clock mode is set as a sleep mode and supply voltage is decreased like [according to this] the slow mode in the 2nd operation gestalt, it turns out that a power-source current also decreases. Namely, the power-source current in case a clock is a slow mode is 1.2mA to being 2.3mA at the time of 3V, when supply voltage is 5V. When this is converted into power consumption, it turns out that the power consumption which was 11.5mW

when supply voltage was 5V decreases even to 3.6mW by lowering supply voltage to 3V. That is, according to the example of this drawing, ** which lowers the supply voltage of the computer which made the clock the sleep mode in the state of standby to 3V from 5V shows that it is effective in making about 1/3 reduce the power consumption of a computer.

[0061]

[Effect of the Invention] According to this invention, the electronic equipment which can reduce standby power requirement can be offered.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the electronic equipment which has a standby condition and a normal state, and relates to the electronic equipment which reduces the power consumption in a standby condition especially.

[0002]

[Translation done.]

*** NOTICES ***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] In recent years, it is one of the technical problems of the industrial world from a viewpoint of energy saving or an environmental problem that the electronic equipment in the condition of having left the anticipated-use condition reduces the power (henceforth standby power requirement) consumed in the condition [having energized]. therefore, the condition (henceforth a normal state) of carrying out the usual actuation -- in addition, the electronic equipment which established the condition (henceforth a standby condition) of having stopped the normal operating state and having held down consumption of power is manufactured. [0003] When electronic equipment is conventionally set as a standby condition, the standby power requirement of electronic equipment is made to reduce by cutting off supply of supply voltage in the circuit (henceforth a main circuit) which is not operating in a standby condition. moreover, the case of the electronic equipment which has a computer in the circuit (henceforth *****) which operates in a standby condition -- the above-mentioned approach -- in addition, reduction of the further standby power requirement is aimed at by reducing the clock frequency of the computer of a standby condition, or suspending a clock.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, the electronic equipment which can reduce standby power requirement can be offered.

[Translation done.]

*** NOTICES ***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the power consumed in a standby condition with the electrical potential difference of the part which the minimum value of supply voltage which guarantees the normal actuation in the standby condition of ***** may decrease compared with the minimum value of a normal state, and decreased in that case was vainly consumed, in spite of having not been related to stable actuation of *****.

[0005] This invention is made in view of this situation, and the purpose is in offering the electronic equipment which can reduce the standby power requirement in a standby condition.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the power consumed in a standby condition with the electrical potential difference of the part which the minimum value of supply voltage which guarantees the normal actuation in the standby condition of ***** may decrease compared with the minimum value of a normal state, and decreased in that case was vainly consumed, in spite of having not been related to stable actuation of *****.

[0005] This invention is made in view of this situation, and the purpose is in offering the electronic equipment which can reduce the standby power requirement in a standby condition.

[Translation done.]

PAT-NO: JP02001178021A
DOCUMENT-IDENTIFIER: JP 2001178021 A
TITLE: ELECTRONIC APPARATUS

PUBN-DATE: June 29, 2001

INVENTOR-INFORMATION:

NAME	COUNTRY
AMANO, TOSHIO	N/A
OMURA, TADASHI	N/A
INOUE, HIROYUKI	N/A
KONUMA, KENICHI	N/A

ASSIGNEE-INFORMATION:

NAME	COUNTRY
SONY CORP	N/A

APPL-NO: JP11352228
APPL-DATE: December 10, 1999

INT-CL (IPC): H02J009/06 , G06F001/32 , G06F001/04

ABSTRACT:

PROBLEM TO BE SOLVED: To provide an electronic apparatus having a function controlling standby power in a standby state in the electronic apparatus having a slave circuit, whose lowest value of power supply voltage ensuring its operation in the standby state is lower than in the normal state.

SOLUTION: This electronic apparatus is provided with a main power supply 1 for receiving an operating condition selecting signal S4 selecting the normal state to output 5 V, and receiving the operating condition selecting signal S4 selecting the standby state to output 0 V, a standby operating power supply 2 for outputting 3 V, a main circuit 3 for receiving the 5 V from the main power supply 1 to perform operation in the normal state, and receiving the 0 V from the

main power supply 1 to stop its operation, a slave circuit 4 for receiving the 5 V from the main power supply 1 to perform operation in the normal state, and receiving the 3V from the standby operating power supply 2 to operate in the standby state, and a power source switching part 5 for receiving outputs from the main power source 1 and the standby operating power supply 2, and selecting and supplying the larger voltage thereof to supply it to the slave circuit 4.

COPYRIGHT: (C)2001,JPO

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, by the electronic equipment of this invention The main power supply which outputs the 1st electrical potential difference in response to the operating state selection signal which chooses a normal state, and outputs the 2nd electrical potential difference in response to the operating state selection signal which chooses a standby condition, The power source for standby actuation which outputs the 3rd larger electrical potential difference smaller than the 1st electrical potential difference of the above than the 2nd electrical potential difference of the above, The 1st electrical potential difference by the above-mentioned main power supply is received, and it is actuation of a normal state. The main circuit which carries out and suspends actuation in response to the 2nd electrical potential difference by the above-mentioned main power supply, It is based on the above-mentioned main power supply. ***** which operates a normal state in response to the 1st electrical potential difference, and operates a standby condition in response to the 3rd electrical potential difference by the above-mentioned power source for standby actuation, It was made to have the power-source change-over section which chooses any or a large electrical potential difference and is supplied to ***** in response to the output of the above-mentioned main power supply, and the output of the above-mentioned power source for standby actuation.

[0007] The main power supply which outputs the 1st electrical potential difference to an input in response to a predetermined electrical potential difference by the electronic equipment of this invention, The input switch opened when the operating state selection signal which is connected between the input of the above-mentioned main power supply and the input which supplies an electrical potential difference to electronic equipment, flows when

the operating state selection signal which chooses a normal state is received, and chooses a standby condition is received, The power source for standby actuation which outputs the 2nd electrical potential difference smaller than the 1st electrical potential difference of the above, The main circuit which operates a normal state in response to the 1st electrical potential difference by the above-mentioned main power supply, The 2nd ** in response to the 1st electrical potential difference by the above-mentioned main power supply, operate a normal state, and according to the above-mentioned power source for standby actuation ***** which operates a standby condition in response to **, The output and for [above-mentioned] standby actuation It was made to have the power-source change-over section which chooses any or a large electrical potential difference and is supplied to ***** in response to the output of a power source. [of the above-mentioned main power supply]

[0008] Made the device actuation signal receive, the time of the signal with which a device actuation signal specifies a normal state made the operating state selection signal which chooses a normal state output to the above-mentioned main power supply, and the time of the signal with which a device actuation signal specifies a standby condition made the operating state selection signal which chooses a standby condition output to the above-mentioned main power supply in the above-mentioned ***** of the electronic equipment of this invention.

[0009] The above-mentioned main circuit was made to output an appliance control signal in the above-mentioned ***** of the electronic equipment of this invention at the time of a normal state.

[0010] It was made to operate on the 1st frequency at the time of a normal state, and was made to operate on the 2nd frequency lower than the 1st frequency concerned in a standby condition in the above-mentioned ***** of the electronic equipment of this invention. In addition, it was made to operate on the 1st frequency in the above-mentioned main circuit at the time of a normal state, and the above-mentioned appliance control signal was synchronized with the 1st frequency in the above-mentioned ***** at the time of a normal state.

[0011] When the device actuation signal which specifies the above-mentioned normal state in a standby condition is received in the above-mentioned ***** of the electronic equipment of this invention After outputting the operating state selection signal which chooses the above-mentioned normal state to a main power supply, When the device actuation signal which is made to switch clock frequency to the 1st frequency, and specifies the above-

mentioned standby condition in a normal state after the passage of time set up beforehand is received. Cycle of operation: After switching a number to the 2nd frequency, the operating state selection signal which chooses the above-mentioned standby condition was made to output to a main power supply. Or in the above-mentioned *****, when the above-mentioned device actuation signal is received in a standby condition. After switching clock frequency to the 3rd frequency lower than the 1st frequency, the above-mentioned normal state is chosen. An operating state selection signal is outputted to a main power supply. After the passage of time set up beforehand, it is clock frequency. When the device actuation signal which is made to switch to the 1st frequency and specifies the above-mentioned standby condition in a normal state is received. After outputting the operating state selection signal which chooses the above-mentioned standby condition to a main power supply, clock frequency was made to be switched to the 2nd frequency.

[0012] If the signal (henceforth an operating state selection signal) with which a main power supply chooses a normal state or a standby condition (both conditions are hereafter called operating state) is received according to the electronic equipment of this invention, electronic equipment will be set as a normal state or a standby condition according to the signal. At the time of a normal state, an electrical potential difference is supplied to a main circuit and ***** from a main power supply, and the usual actuation is performed. In a standby condition, an electrical potential difference lower than a normal state is supplied to a main circuit from a main power supply, and actuation of a main circuit stops. For this reason, electronic equipment is set as the standby condition which the usual actuation stopped. At this time, an electrical potential difference lower than the electrical potential difference of the main power supply of a normal state is supplied to ***** from the power source for standby actuation, and actuation of a standby condition is performed.

[0013] If the operating state selection signal which chooses a normal state as an operating state selection signal is specifically received, the 1st electrical potential difference will be supplied to a main circuit from a main power supply. Since the usual actuation is performed by this in a main circuit, electronic equipment is set as a normal state. On the other hand, the output voltage of a main power supply and the output voltage of the power source for standby actuation are received, any or a large electrical potential difference is chosen, and the power-source change-over section is supplied to *****.

Although the 1st electrical potential difference by the main power supply and the electrical potential difference by the power source for standby actuation

are inputted into the electrical-potential-difference change-over section at this time, since the output voltage of the power source for standby actuation is set up so that it may become smaller than the 1st electrical potential difference by the main power supply, the 1st electrical potential difference according to a main power supply in the output of the electrical-potential-difference change-over section is outputted. Therefore, the 1st electrical potential difference by the main power supply is supplied to *****.

[0014] Moreover, if the operating state selection signal which chooses a standby condition is received, the 2nd electrical potential difference lower than the 1st electrical potential difference by the main power supply and the electrical potential difference by the power source for standby actuation will be supplied to a main circuit from a main power supply. Since this 2nd electrical potential difference is lower than the supply voltage to which a main circuit can operate, actuation of a main circuit stops and, thereby, electronic equipment is set as a standby condition. Although the 2nd electrical potential difference by the main power supply and the electrical potential difference by the power source for standby actuation are inputted into the electrical-potential-difference change-over section at this time, since the output voltage of the power source for standby actuation is set up so that it may become larger than the 2nd electrical potential difference by the main power supply, the electrical potential difference according to the power source for standby actuation in the output of the electrical-potential-difference change-over section is outputted. Therefore, the electrical potential difference by the power source for standby actuation is supplied to *****.

[0015] According to the electronic equipment of this invention, if an input switch receives an operating state selection signal, electronic equipment will be set as a normal state or a standby condition according to the signal. At the time of a normal state, an electrical potential difference is supplied to a main circuit and ***** from a main power supply, and the usual actuation is performed. In a standby condition, an electrical potential difference is not supplied to a main circuit from a main power supply, but actuation of a main circuit stops. For this reason, electronic equipment is set as the standby condition which the usual actuation stopped. At this time, an electrical potential difference lower than the electrical potential difference of the main power supply of a normal state is supplied to ***** from the power source for standby actuation, and actuation of a standby condition is performed.

[0016] If the operating state selection signal with which an input switch chooses a normal state is specifically received, an input switch will flow and

an electrical potential difference will be supplied to the input of a main power supply from the power-source input which supplies an electrical potential difference to electronic equipment. Thereby, a main power supply outputs the 1st electrical potential difference. Since the main circuit to which the 1st electrical potential difference by the main power supply was supplied performs the usual actuation, electronic equipment is set as a normal state. On the other hand, the output voltage of a main power supply and the output voltage of the power source for standby actuation are received, any or a large electrical potential difference is chosen, and the power-source change-over section is supplied to *****. Although the 1st electrical potential difference by the main power supply and the 2nd electrical potential difference by the power source for standby actuation are inputted into the electrical-potential-difference change-over section at this time, since the 2nd electrical potential difference by the power source for standby actuation is set up so that it may become smaller than the 1st electrical potential difference by the main power supply, the 1st electrical potential difference according to a main power supply in the output of the electrical-potential-difference change-over section is outputted. Therefore, the 1st electrical potential difference by the main power supply is supplied to *****.

[0017] Moreover, if the operating state selection signal with which an input switch chooses a standby condition is received, an input switch becomes non-****, and since the electrical potential difference currently supplied to the input of a main power supply from the power-source input is severed by this, the output voltage of a main power supply will decline to 0V. Since an electrical potential difference falls to 0V, the electrical potential difference supplied from a main power supply suspends actuation of a main circuit, and electronic equipment is set as a standby condition. Although the 2nd electrical potential difference by electrical-potential-difference 0V and the power source for standby actuation by the main power supply is inputted into the electrical-potential-difference change-over section at this time, since the output voltage of the power source for standby actuation is larger than the electrical potential difference by the main power supply which fell to 0V, the 2nd electrical potential difference according to the power source for standby actuation in the output of the electrical-potential-difference change-over section is outputted. Therefore, the 2nd electrical potential difference by the power source for standby actuation is supplied to *****.

[0018]

[Embodiment of the Invention] Drawing 1 is the circuit diagram showing the

1st operation gestalt of the electronic equipment concerning this invention. drawing 1 -- setting -- 1 -- as for a main circuit and 4, ***** and 5 show D1, and, as for the power source for standby actuation of a dc output, and 3, the main power supply of a dc output and 2 show diode, respectively, as for the power-source change-over section and D2. Moreover, in a power-source input for IN to supply power to electronic equipment, and A, B and C, the node of a circuit and S1 show a device actuation signal, and S4 shows the operating state selection signal, respectively.

[0019] A main power supply 1 has received operating state selection-signal S4 from ***** 4 while it operates in response to an electrical potential difference from the power-source input IN and outputs direct current voltage to a main circuit 3 and the power-source change-over section 5. At the time of the signal with which operating state selection-signal S4 chooses a normal state, a main power supply 1 outputs the direct current voltage which operates a main circuit, 5V [for example,], and outputs an electrical potential difference with a main power supply 1 lower than a normal state, 0V [for example,], at the time of the signal with which operating state selection-signal S4 chooses a standby condition. The power source 2 for standby actuation operates in response to an electrical potential difference from the power-source input IN, is larger than the electrical potential difference which a main power supply 1 outputs in a standby condition smaller than the electrical potential difference outputted in a normal state, for example, outputs the direct current voltage of 3V to the power-source change-over section 5. The negative side terminal of the output of a main power supply 1 and the power source 2 for standby actuation is connected to the common gland of a circuit.

[0020] The power-source change-over section 5 receives the electrical potential difference from a main power supply 1 and the power source 2 for standby, compares both electrical potential difference, and is outputting any or a large electrical potential difference to ***** 4. This electrical-potential-difference change-over section specifically consists of diodes D1 and D2. The anode of diode D1 receives the electrical potential difference from a main power supply 1, and the anode of diode D2 has received the electrical potential difference from the power source 2 for standby actuation, respectively. It connects, the node serves as an output of the electrical-potential-difference change-over section, and both the cathodes of these two diodes are outputting the electrical potential difference to ***** 4. In addition, diodes D1 and D2 are changed into the switch by semiconductor devices, such as a transistor, and the power-source change-over section 5 can

also constitute them.

[0021] A main circuit 3 operates in response to an electrical potential difference at the time of a normal state from a main power supply 1. ***** 4 processes this in response to the device actuation signal S1, and outputs operating state selection-signal S4 to a main power supply 1 while it operates in response to an electrical potential difference from the power-source change-over section 5. Operating state selection-signal S4 is a signal which chooses the operating state of electronic equipment as either a normal state or a standby condition. The grand terminal of a main circuit 3 and ***** 4 is connected to the common gland of a circuit.

[0022] Next, the actuation in the above configuration is explained. If ***** 4 receives the device actuation signal S1 which specifies a standby condition, ***** 4 will output operating state selection-signal S4 which chooses a standby condition to a main power supply 1. The main power supply 1 which received said signal outputs 0V as output voltage. In electrical-potential-difference 0V by this main power supply 1, since the main circuit 3 which has received the electrical potential difference from the main power supply 1 cannot operate, it suspends actuation. When a main circuit 3 suspends actuation, electronic equipment will be in a standby condition. While the electrical potential difference of the A point which is the output of a main power supply 1 is set to 0V, it has become the electrical potential difference by the power source 2 for standby actuation, 3V [for example,], at the B point, and the electrical potential difference of a B point becomes larger than the electrical potential difference of an A point. Since diode D2 flows and diode D1 is un-flowing by this, supply voltage 3V of the power source 2 for standby actuation are supplied to ***** 4 through diode D2. Since ***** 4 is constituted from a component for which supply voltage 3V operate, it operates normally.

[0023] If ***** 4 receives the device actuation signal S1 which specifies a normal state, ***** 4 will output operating state selection-signal S4 which chooses a normal state to a main power supply 1. The main power supply 1 which received said signal outputs 5V as output voltage. The main circuit 3 which has received the electrical potential difference from the main power supply 1 starts actuation by electrical-potential-difference 5V by this main power supply 1. When a main circuit 3 carries out the usual actuation, electronic equipment will be in a normal state. While the electrical potential difference of the A point which is the output of a main power supply 1 is set to 5V, it is still electrical-potential-difference 3V by the power source 2 for

standby actuation, and the electrical potential difference of a B point becomes smaller than the electrical potential difference of an A point at a B point. Since diode D1 flows and diode D2 is un-flowing by this, supply voltage 3V of a main power supply 1 are supplied to ***** 4 through diode D1. Since ***** 4 is constituted from a component for which supply voltage 5V operate, it operates normally.

[0024] As explained above, according to the 1st operation gestalt, the minimum value of supply voltage required for actuation of ***** 4 can make small supply voltage supplied to ***** 4 compared with a normal state in a standby condition in a standby condition, when low compared with the minimum value of supply voltage required for actuation of a main circuit 3 at the time of a normal state. Thereby, since not only the main circuit 3 but the power consumption of ***** 4 is reducible, compared with the case where it does not have a standby-power-requirement control function by this invention, the standby power requirement of electronic equipment is reducible.

[0025] Moreover, when ***** 4 operates with the clock frequency set up beforehand, the standby power requirement of electronic equipment can be made to reduce further in the 1st operation gestalt by adding the circuit which changes a clock frequency into ***** 4 according to supply voltage. ***** 4 sets a clock as the 1st frequency required for actuation of a normal state, when ***** 4 receives the supply voltage of a normal state, and when the supply voltage of a standby condition is received, specifically, it has the circuit which changes a clock into the 2nd frequency lower than the 1st frequency. The frequency of the clock in a standby condition falls by adding the aforementioned circuit to ***** 4, and thereby, since the amount per unit time amount of the power loss produced according to the charge and discharge current which flows to the capacity component of each part of ***** 4 to one period of a clock decreases, the standby power requirement of electronic equipment is reducible.

[0026] Next, intermediary explanation is given at the 2nd operation gestalt of the electronic equipment concerning this invention. Drawing 2 is the circuit diagram showing the 2nd operation gestalt. The same sign of drawing 1 and drawing 2 expresses the same contents. drawing 2 -- setting -- 1A -- in an input switch and RL, a relay and Q show a npn transistor and, as for the main power supply of a dc output, and 4A, R shows [***** and 6] resistance, respectively.

[0027] The input of main power supply 1A has received the electrical potential difference from the power-source input IN through the input switch

6. When the input switch 6 flows, main power supply 1A operates and outputs direct current voltage, 5V [for example,], to a main circuit 3 and the power-source change-over section 5. The negative side terminal of the output of main power supply 1A is connected to the common gland of a circuit.

[0028] ***** 4A processes this in response to the device actuation signal S1, and outputs operating state selection-signal S4 to the input switch 6 while it operates in response to an electrical potential difference from the power-source change-over section 5. Operating state selection-signal S4 is a signal which chooses the operating state of electronic equipment as either a normal state or a standby condition. The gland of a main circuit is connected to the common gland of a circuit.

[0029] It connects between the power-source input IN and main power supply 1A, and the input switch 6 gets down, and carries out the power-source input IN and electrical installation between main power supply 1A to a flow or un-flowing according to the operating state selection signal 4 received from *****4A. At the time of the signal with which the operating state selection signal 4 chooses a standby condition, the input switch 6 flows and the input switch 6 is un-flowing at the time of the signal which chooses a standby condition. The input switch 6 is specifically constituted by npn-transistorQ Relay RL and for a relay drive, and base resistance R. The contact of Relay RL is connected between the power-source input IN and main power supply 1A, one [which drives a contact] terminal of a coil has received the electrical potential difference from the power source 2 for standby actuation, and the other-end child is connected to the collector of npn-transistor Q. The contact of Relay RL flows through a contact, when the current of the convention to a drive coil is passed. The emitter of npn-transistor Q is connected to the common gland of a circuit, and the base has received operating state selection-signal S4 from *****4A through Resistance R. In addition, even if it receives the electrical potential difference for driving Relay RL from the place which is within the limits of an electrical potential difference required for the drive of not only the output of the power source 2 for standby actuation but a relay, and can usually supply an electrical potential difference also in the state of any with standby, for example, C point etc., it is possible. Moreover, Relay RL is transposed to the switch by semiconductor devices, such as a transistor, and the input switch 6 can also constitute it.

[0030] Next, the actuation in the above configuration is explained. If ***** 4A receives the device actuation signal S1 which specifies a standby condition, since operating state selection-signal S4 will be set to 0V and the

base current of npn-transistor Q will be drained, between the collector emitters of npn-transistor Q will be un-flowing, the drive coil current of Relay RL will not flow, and Relay RL is cut. If Relay RL cuts, the input voltage to main power supply 1A is severed, the output voltage of main power supply 1A will decline toward 0V, and the electrical potential difference of a B point will become larger than the electrical potential difference of an A point. Since diode D2 flows and diode D1 is un-flowing by this, the output voltage of the power source 2 for standby actuation, 3V [for example,], is supplied to *****4A through diode D2. Since supply voltage is constituted from a component for which 3V operate, ***** 4A operates normally. Since supply of supply voltage is cut off and actuation of a circuit stops a main circuit 3, electronic equipment will be in a standby condition.

[0031] If ***** 4A receives the device actuation signal S1 which specifies a normal state, since the base current of npn-transistor Q flows to Resistance R, between the emitter-collector of npn-transistor Q will flow and a current will flow to the drive coil of Relay RL with the electrical potential difference of operating state selection-signal S4, the contact of Relay RL flows. If Relay RL flows, input voltage will be supplied to main power supply 1A, and the electrical potential difference of an A point will turn into the output voltage of a main power supply, 5V [for example,]. Since output voltage 5V of a main power supply 1 are set up more greatly than output voltage 3V of the power source 2 for standby actuation, the electrical potential difference of a B point becomes smaller than the electrical potential difference of an A point. Since diode D2 is un-flowing and diode D1 flows by this, the supply voltage of main power supply 1A is supplied to *****4A through diode D1. Since supply voltage is constituted from a component for which 5V operate, ***** 4A operates normally. Electrical-potential-difference 5V of main power supply 1A will be supplied, a main circuit 3 will start actuation, and electronic equipment will be in a normal state.

[0032] As explained above, even if it does not have the function in which main power supply 1A controls output voltage like the 1st operation gestalt according to the 2nd operation gestalt, the output voltage of main power supply 1A is controllable by forming the input switch 6 of the easy configuration by relay etc. in the input side of main power supply 1A. Thereby, in a standby condition, when low compared with the minimum value of the supply voltage which needs the minimum value of supply voltage required for actuation of ***** 4A for actuation of a main circuit 3 at the time of a normal state, compared with a normal state, things can do small

supply voltage supplied to ***** 4A in a standby condition. Therefore, since not only the main circuit 3 but the power consumption of ***** 4A is reducible in a standby condition, compared with the case where it does not have a standby-power-requirement control function by this invention, the standby power requirement of electronic equipment is reducible.

[0033] Moreover, when ***** 4 operates with the clock frequency set up beforehand, the standby power requirement of electronic equipment can be made to reduce further in the 2nd operation gestalt by adding the circuit which changes a clock frequency into ***** 4A according to supply voltage.

***** 4A sets a clock as the 1st frequency required for actuation of a normal state, when ***** 4A receives the supply voltage of a normal state, and when the supply voltage of a standby condition is received, specifically, it has the circuit which changes a clock into the 2nd frequency lower than the 1st frequency. The frequency of the clock in a standby condition falls by adding the aforementioned circuit to ***** 4A, and since the amount per unit time amount of the power loss produced according to the charge and discharge current which flows to the capacity component of each part of ***** 4A to one period of a clock decreases, the standby power requirement of electronic equipment is reducible.

[0034] Next, lessons is taken from the 3rd operation gestalt of the electronic equipment concerning this invention, and it explains. Drawing 3 is the circuit diagram showing the 3rd operation gestalt. The same sign of drawing 2 and drawing 3 expresses the same contents. drawing 3 -- setting -- 2A -- the power source for standby actuation of a dc output, and 3A -- a main circuit and 4B -- ***** and 41 -- an input circuit and 42 -- a computer and 43 -- a capacitor and T show a transformer and, as for nonvolatile memory and 44, in diode, and C1 and C2, U shows [a reset circuit and D3] the electrical-potential-difference stabilization circuit, respectively. Moreover, S3 shows the appliance control signal.

[0035] Power-source 2A for standby actuation operates in response to an electrical potential difference from the power-source input IN, is larger than the electrical potential difference which main power supply 1A outputs in a standby condition smaller than the electrical potential difference outputted in a normal state, for example, outputs the direct current voltage of 3V to the power-source change-over section 5. The negative side terminal of the output of power-source 2A for standby actuation is connected to the common gland of a circuit. This power-source 2A for standby actuation is specifically constituted by Transformer T, diode D3, capacitors C1 and C2, and the

electrical-potential-difference stabilization circuit U1. The upstream is connected to the power-source input IN, and one terminal of a secondary is connected [Transformer T] to the anode of diode D3 for the other-end child in the gland where a circuit is common. The anode is connected to the secondary terminal of Transformer T, and the cathode is connected to the input of a capacitor C1 and the electrical-potential-difference stabilization circuit U, and the drive coil of Relay RL for diode D3. One terminal is connected to the cathode of diode D3 for the other-end child in the common gland, and, as for a capacitor C1, the direct current voltage which carried out smooth, 4V [for example,], generates the electrical potential difference rectified by the both ends for Transformer T and diode D3. Although these electrical-potential-difference 4V are supplied to the drive coil of Relay RL as an electrical potential difference for a relay drive in drawing 3 , if it is the range of the electrical potential difference which can drive Relay RL, it is also possible to supply an electrical potential difference from a B point or C point. The electrical-potential-difference stabilization circuit U lowers the pressure of and stabilizes electrical-potential-difference 4V received from the cathode of diode D3, and outputs direct current voltage, 3V [for example,], to the electrical-potential-difference change-over section 5. As for a capacitor C2, an other-end child removes [one terminal] the high frequency component which is connected in the gland where a circuit is common and is contained in the output voltage of the electrical-potential-difference stabilization circuit U to the output of the electrical-potential-difference stabilization circuit U.

[0036] Main circuit 3A receives an electrical potential difference from main power supply 1A, and operates at the time of a normal state. Moreover, actuation according to the device actuation signal S1 sent from the outside of electronic equipment is carried out with the appliance control signal S3 received from *****4B. The gland of main circuit 3A is connected to the common gland of a circuit. ***** 4B -- the power-source change-over section 5 to an electrical potential difference -- winning popularity -- usually - - ** -- standby -- it operates also in the state of any. Moreover, while processing this in response to the device actuation signal S1 and outputting operating state selection-signal S4 to the input switch 6, the device actuation signal S3 is outputted to main circuit 3A. The gland of ***** 4B is connected to the common gland of a circuit. Operating state selection-signal S4 is a signal which chooses the operating state of electronic equipment as either a normal state or a standby condition. The appliance control signal S3 is a signal for the signal with which ***** 4B processed and generated the

device actuation signal S1, and ***** 4B to control main circuit 3A. In addition, when operating main circuit 3A and ***** 4B with the same clock, it is possible to output the control signal which synchronized with the clock of ***** 4B and this to main circuit 3A as an appliance control signal S3.

Thereby, in a normal state, main circuit 3A operates with the clock of the same frequency which synchronized with ***** 4B. Moreover, the appliance control signal S3 synchronizes with the clock of ***** 4B.

[0037] This ***** 4B specifically consists of each circuit of an input circuit 41, a computer 42, nonvolatile memory 43, and a reset circuit 44. The input circuit 41 has sent to the computer 42 the signal which processed the device actuation signal S1. It outputs operating state selection-signal S4 to an input switch, and is controlling the operating state of electronic equipment while a computer 42 processes the signal received from the input circuit, generates the appliance control signal S3 and outputs it to main circuit 3A. Moreover, the signal which initializes actuation of a computer is received from a reset circuit. Furthermore, the signal about writing and read-out of the information about operating state is inputted or outputted between nonvolatile memory 43, for example. The reset circuit 44 has sent the signal for resetting a computer at the time of the injection of the power source of electronic equipment to the computer 42. The information on current operating state is received from a computer 42, and nonvolatile memory 43 stores it. And when it is again supplied after the electrical potential difference supplied to electronic equipment was intercepted, a computer 42 receives said information before intercepting an electrical potential difference from nonvolatile memory 43, and returns to the condition before an electrical potential difference is intercepted.

[0038] Next, actuation by the above configuration is explained. Drawing 4 is a timing chart explaining actuation of the circuit of drawing 3. (A) expresses change of operating state, i.e., a standby condition, or a normal state. (B) and (C) express change of the flow of the switch-on of diodes D1 and D2, i.e., diode, or not flowing. The notation of ON of drawing and OFF means that ON does not flow through a flow and OFF. (D) expresses change of the electrical potential difference of C point of drawing 2, i.e., the supply voltage supplied to ***** 4B. (E) expresses change of the clock frequency in the clock mode 42, i.e., a computer. (F) expresses change of the device actuation signal S1 sent to an input circuit 41. The device actuation signal S1 is a signal of time series sent by infrared radiation from an external device. It means that the signal with which ON specifies a normal state in the notation of ON of

drawing and OFF, and the signal with which OFF specifies a standby condition have been sent. (G) expresses change of the electrical potential difference which controls closing motion of operating state selection-signal S46 inputted into the input switch 6, i.e., an input switch. T0-T8 express time of day.

[0039] Actuation of the circuit of drawing 3 which shows the 3rd operation gestalt is explained using the timing diagram of drawing 4. In time of day T0, operating state selection-signal S4 is set as 0V, and the contact of Relay RL is opened wide. For this reason, since main power supply 1A does not output and the electrical potential difference is not supplied to main circuit 3A, the operating state of electronic equipment is in a standby condition. The electrical potential difference of a B point has turned into the electrical potential difference, 3V [for example,], which lowered the pressure of the output voltage of the half wave rectifier circuit which Transformer T, diode D3, and a capacitor C1 constitute, 4V [for example,], by the stabilization circuit U. Therefore, since electrical-potential-difference 3V of a B point are larger than electrical-potential-difference 0V of an A point, diode D2 flows, diode D1 is un-flowing and the electrical potential difference of C point is set to 3V. In addition, the clock of a computer 42 is set as the slow mode at this time.

[0040] In time of day T1, the device actuation signal S1 which specifies a normal state is sent to an input circuit 41. Since ***** 4B consists of components which operate [3V or], it can process the device actuation signal S1 also in the state of standby. The computer 42 which received the device actuation signal S1 processes this, and sends the appliance control signal S3 to main circuit 3A.

[0041] In time of day T2, a computer 42 outputs the 3V [same] as the supply voltage of ***** as operating state selection-signal S4. A sink, and the collector and emitter of npn-transistor Q flow through a current at the base of npn-transistor Q, and the resistance R which received this electrical potential difference drives Relay RL. The driven relay RL makes it flow through a contact after fixed time amount, and, thereby, an electrical potential difference is supplied to the input of main power supply 1A.

[0042] In time-of-day T3, since the output voltage of main power supply 1A to which input voltage was supplied is set to 5V and supply voltage 5V are supplied to main circuit 3A, operating state shifts to a normal state from a standby condition. On the other hand, since the electrical potential difference of a B point is still 3V, electrical-potential-difference 3V of a B point become

smaller than electrical-potential-difference 5V of an A point, diode D2 is un-flowing and diode D1 flows through it. Therefore, the electrical potential difference of C point is set to output voltage 5V of main power supply 1A.

[0043] In time-of-day T four, a computer 42 changes a clock into fast mode from a slow mode. That is, a computer 42 is performing processing which switches a clock to fast mode from a slow mode, after waiting for fixed time amount until the supply voltage supplied rises from 3V to 5V. This is in the condition that the supply voltage of a computer 42 is low, and is processing for not making a clock into fast mode.

[0044] The reason for performing this processing is explained using drawing 6. Drawing 6 is a graph which shows an example of the property about the power-source current and supply voltage of a computer, an axis of ordinate expresses a power-source current, and an axis of abscissa expresses supply voltage. Four characteristic curves show the property corresponding to each KUROKKUMO-DO. Moreover, the continuous-line part of a characteristic curve shows the fluctuation range of supply voltage where a computer can operate normally in each KUROKKUMO-DO. According to this, it turns out that the fluctuation range of a power source tends to be large on a low-battery side, so that KUROKKUMO-DO becomes a low speed from a high speed. That is, although the fluctuation range of the supply voltage in fast mode is 5.5V from 4.5, it is 5.5V from 3.5 in the slow mode. In order to reduce standby power requirement, when the supply voltage of the computer in a standby condition is set as the minimum of said fluctuation range, it becomes impossible therefore, for a computer to operate with the clock of fast mode. In order to solve this problem, the computer 42 is performing the above-mentioned processing which is made not to make a clock fast mode in the condition that the supply voltage supplied is low.

[0045] It sets time-of-day T5 and the device actuation signal S1 which specifies a standby condition is sent to an input circuit 41.

[0046] In time of day T6, a computer 42 changes a clock into a slow mode from fast mode. That is, the computer 42 is performing processing which switches a clock to a slow mode from fast mode, before the supply voltage supplied falls to 3V from 5V. This is also in the condition same with the processing in time-of-day T four that the supply voltage of a computer 42 is low, and is processing for not making a clock into fast mode.

[0047] In time of day T7, a computer 42 sets operating state selection-signal S4 to 0V. Thereby, the collector current of npn-transistor Q will not flow, Relay RL makes a contact open wide after fixed time amount, and supply of

the electrical potential difference to the input of main power supply circuit 1A is cut off.

[0048] In time of day T8, since the output of main power supply 1A which had the input severed declines toward 0V and supply voltage is no longer supplied to a main circuit 3, operating state shifts to a standby condition from a normal state. Since the electrical potential difference of a B point is still 3V while the electrical potential difference of an A point is set to 0V by the above, electrical-potential-difference 3V of a B point become larger than electrical-potential-difference 0V of an A point, diode D2 flows and diode D1 is un-flowing. Therefore, the electrical potential difference of C point is set to 3V.

[0049] As explained above, according to the 3rd operation gestalt, a computer 42 can reduce the power consumed in the state of standby by making smaller than a normal state the electrical potential difference which supplies the clock of the computer 42 in a standby condition to ***** 4 in a standby condition from fast mode in addition to setting it as a slow mode.

[0050] By making smaller than a normal state the electrical potential difference supplied to ***** 4B, drawing 7 which explains the effectiveness that the standby power requirement which a computer 42 consumes is reduced, using drawing 7 is a graph which shows an example of the property about the power-source current and supply voltage of a computer, an axis of ordinate expresses a power-source current, and an axis of abscissa expresses supply voltage. Four characteristic curves show the property corresponding to each KUROKKUMO-DO. It turns out that clock mode is fixed according to this, and a power-source current will also decrease if supply voltage is decreased. Namely, the power-source current in case a clock is a slow mode is 1.8mA to being 3.2mA at the time of 3V, when supply voltage is 5V. When this is converted into power consumption, it turns out that the power consumption which was 16mW when supply voltage was 5V decreases even to 5.4mW by lowering supply voltage to 3V. That is, according to the example of this drawing, ** which lowers the supply voltage of the computer which made the clock the slow mode in the state of standby to 3V from 5V shows that it is effective in making about 1/3 reduce the power consumption of a computer.

[0051] Next, lessons is taken from the 4th operation gestalt of the electronic equipment concerning this invention, and it explains. The description of the 4th operation gestalt is the same circuitry as drawing 3 which shows the 2nd operation gestalt, and is to set the clock of the computer 42 in a standby

condition as a sleep mode. In a sleep mode, a computer has least power which has suspended actuation and a computer consumes then compared with other clock modes.

[0052] Drawing 5 is a timing chart explaining actuation of the 4th operation gestalt. The same signs in drawing 5 and drawing 4 are the same contents as drawing 3. In time of day T0, operating state selection-signal S4 is set as 0V, and the contact of Relay RL is opened wide. For this reason, since main power supply 1A does not output and the electrical potential difference is not supplied to main circuit 3A, the operating state of electronic equipment is in a standby condition. By the above, the electrical potential difference of an A point is 0V, and, on the other hand, the electrical potential difference of a B point has become 3V which lowered the pressure of output 4V of the power source 2 for standby actuation by the stabilization circuit U. Therefore, it becomes larger [electrical-potential-difference 3V of a B point] than electrical-potential-difference 0V of an A point, and diode D2 flows, diode D1 is un-flowing and the electrical potential difference of C point has become 3V. In addition, the clock of a computer 42 is set as the sleep mode, and the computer 42 has suspended actuation.

[0053] In time of day T1, if the device actuation signal S1 is sent to an input circuit 41, an input circuit 41 will send the signal for canceling a sleep mode to a computer 42. The computer 42 which received this signal sets a clock as a slow mode, and starts actuation. Thereby, a computer 42 processes the device actuation signal S1 sent from an input circuit 41, and sends the appliance control signal S3 to main circuit 3A.

[0054] In time of day T2, a computer 42 outputs 3V as operating state selection-signal S4. A sink, and the collector and emitter of npn-transistor Q flow through a current at the base of npn-transistor Q, and the resistance R which received this electrical potential difference drives Relay RL. The driven relay RL makes it flow through a contact after fixed time amount, and, thereby, an electrical potential difference is supplied to the input of main power supply 1A. In time-of-day T3, since the output voltage of main power supply 1A to which input voltage was supplied is set to 5V and supply voltage is supplied to a main circuit 3, operating state shifts to a normal state from a standby condition. On the other hand, since the electrical potential difference of a B point is still 3V, electrical-potential-difference 3V of a B point become smaller than electrical-potential-difference 5V of an A point, diode D2 is un-flowing and diode D1 flows through it. Therefore, the electrical potential difference of C point is set to output 5V of main power supply 1A.

[0055] In time-of-day T four, a computer 42 changes a clock into fast mode from a slow mode. That is, a computer 42 is performing processing which switches a clock to fast mode from a slow mode, after waiting for fixed time amount until the supply voltage supplied rises from 3V to 5V. This is in the condition that the supply voltage of a computer 42 is low, and is processing for not making a clock into fast mode.

[0056] It sets time-of-day T5 and the device actuation signal S1 which specifies a standby condition is sent to an input circuit 41.

[0057] In time of day T6, 0V are outputted as computer 42 operating-state selection-signal S4. Continuously, in T7, a computer 42 changes a clock into a sleep mode from fast mode, and suspends actuation of a computer 42.

Although Relay RL opens a contact wide, supply of the electrical potential difference to the input of main power supply 1A is cut off by this and the output of main power supply 1A declines toward 0V by actuation of time of day T6. Since the time amount which actuation of time of day T6 and time of day T7 completes is shorter than time amount until the output of a main power supply 1 begins to decline enough, also after actuation of time of day T7 is completed, as for operating state, the normal state is held for a while.

[0058] In time of day T8, since the output of a main power supply 1 declines toward 0V and supply voltage is no longer supplied to main circuit 3A, operating state shifts to a standby condition from a normal state. Since the electrical potential difference of a B point is still 3V while the electrical potential difference of an A point is set to 0V by the above, electrical-potential-difference 3V of a B point become larger than electrical-potential-difference 0V of an A point, diode D2 flows and diode D1 is un-flowing. Therefore, the electrical potential difference of C point is set to 3V.

[0059] As explained above, according to the 4th operation gestalt, a computer 42 can reduce the power consumed in the state of standby by making smaller than a normal state the electrical potential difference which supplies the clock of the computer 42 in a standby condition to ***** 4B in a standby condition from fast mode in addition to setting it as a sleep mode.

[0060] By making smaller than a normal state the electrical potential difference supplied to ***** 4B explains the effectiveness that the standby power requirement which a computer 42 consumes is reduced, using drawing 7. When clock mode is set as a sleep mode and supply voltage is decreased like [according to this] the slow mode in the 2nd operation gestalt, it turns out that a power-source current also decreases. Namely, the power-source current in case a clock is a slow mode is 1.2mA to being 2.3mA at the time of

3V, when supply voltage is 5V. When this is converted into power consumption, it turns out that the power consumption which was 11.5mW when supply voltage was 5V decreases even to 3.6mW by lowering supply voltage to 3V. That is, according to the example of this drawing, ** which lowers the supply voltage of the computer which made the clock the sleep mode in the state of standby to 3V from 5V shows that it is effective in making about 1/3 reduce the power consumption of a computer.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the circuit diagram showing the 1st operation gestalt of the electronic equipment which performs standby-power-requirement control of this invention.

[Drawing 2] Drawing 2 is the circuit diagram showing the 2nd operation gestalt of the electronic equipment which performs standby-power-requirement control of this invention.

[Drawing 3] Drawing 3 is the circuit diagram showing the 3rd operation gestalt of the electronic equipment which performs standby-power-requirement control of this invention.

[Drawing 4] Drawing 4 is a timing chart which shows actuation of the 3rd operation gestalt of the electronic equipment which performs standby-power-requirement control of this invention.

[Drawing 5] Drawing 5 is a timing chart which shows actuation of the 4th operation gestalt of the electronic equipment which performs standby-power-requirement control of this invention.

[Drawing 6] Drawing 6 is a graph which shows the supply voltage of the computer to the mode of a clock, the relation of a power-source current, and the fluctuation range of supply voltage.

[Drawing 7] Drawing 7 is a graph which shows the supply voltage of a computer and the relation of a power-source current to the mode of a clock.

[Description of Notations]

1 1A [-- *****, 5 / -- The power-source change-over section, 6 / -- An input switch, S1 / -- A device actuation signal, S4 / -- An operating state selection signal, S3 / -- Appliance control signal.] -- 2 A main power supply, 2A -- 3 The power source for standby actuation, 3A -- A main circuit, 4, 4A, 4B